ANNUAL REPORT 1964

OWRC WATER POLLUTION CONTROL PLANTS

OPERATING SUMMARY

DIVISION OF PLANT OPERATIONS
Ontario Water Resources Commission

1964 OPERATING SUMMARY

Water Pollution Control Plants

ONTARIO WATER RESOURCES COMMISSION

PREFACE

The Division of Plant Operations has been operating water pollution control plants, since the Stratford plant (57-S-2) went into operation in June 1958.

Annual reports have been prepared by the Division at the end of each year on staffed projects which have been in operation for a full year. Standardization of the annual reports facilitates the comparison of operating data for the various projects operated by the Division.

The first summary report was prepared in 1963. It summarized and compared the operating data from 6 primary plants and 21 secondary plants including one total oxidation plant. During 1964, the number of plants increased and this report summarizes the operation of 9 primary plants and 29 secondary plants including 3 total oxidation plants. The diversity of treatment plants has permitted a comprehensive comparison of the various plants.

CONTENTS

TABLES AND GRAPHS

INCLUDED IN REPORT

PLANTS INCLUDED IN REPORT

PRIMARY

			Sludge Handling	Design Flow (MG)
1.	Belleville	61-S-84	Digestion	3.0
2.	Espanola	61-S-74	Digestion	0.665
3.	Fort Erie	59-S-39	Digestion	1.8
4.	Fort William	61-S-91	Digestion	6.0
5.	Owen Sound	60-S-68	Digestion	3.0
6.	Point Edward	59-S-36	Digestion	0.57
7.	Port Arthur	58-S-13	Digestion	4.0
8.	Sault Ste. Marie	59-S-20	Vacuum Filtration	8.0
9.	Trenton	57-S-4	Digestion	1.0

SECONDARY

10.	Brampton	58-S-14	Digestion	2.0
11.	Brantford	58-S-11	Digestion, Vacuum Filtration	12.5
12.	Burlington D. L.	60-S-51	Digestion	2.5
13.	Burlington E. G.	58-S-28	Digestion	0.75
14.	Burlington Sky.	62-S-105	Total Oxidation	3.125
15.	Coniston	57-S-8	Digestion	0.260
16.	Fergus	58-S-23	Digestion	0.6
17.	Galt	61-S-90	Digestion, Vacuum Filtration	5.0
18.	Georgetown	58-S-17	Digestion	1.5
19.	Huntsville	58-S-15	Digestion	0.25
20.	Kingston Twp.	61-S-98	Digestion	0.83

21.	Kitchener	58-S-19	Digestion, Vacuum Filtration	13.5
22.	Lakeview	59-S-43	Digestion	5.0
23.	Markham Village	59-S-40	Digestion	0.334
24.	Moore Twp.	61-S-88	Total Oxidation	0.320
25.	Nepean Twp.	59-S-35	Digestion	1.5
26.	North Bay	58-S-10	Digestion	4.0
27.	Orangeville	58-S-16	-	0.75
28.	Port Colborne E.S.		Digestion	0.85
29.	Port Colborne W.S.	59-S-47	Digestion	0.9
30.	Preston	59-S-46	Vacuum Filtration	1.8
31.	Richmond Hill	57-S-6	Digestion	1.6
32.	Simcoe	62-S-120	Digestion	1.40
33.	Sidney Twp.	62-S-121	Digestion	0.12
34.	Stratford	57-S-2	Digestion	4.0
35.	Streetsville	57-S-5	Digestion	0.8
36.	Tillsonburg	58-S-12	Digestion	0.67
37.	Waterloo	58-S-22	Vacuum Filtration	4.0
38.	Westminster	59-S-33	Total Oxidation	0.25

GRIT REMOVAL

The average grit removal of 2.56 cubic feet per million gallons of sewage agreed with that experienced during 1963.

The amount of grit removed at 23 of the 33 plants was less than the average of 2.56 cubic feet per million gallons. Some of the plants such as Espanola received very large amounts of grit. Each plant has not been analysed to determine the reasons for large amounts of grit. In addition no analyses of the quality of the grit has been perfoemd. In all cases the material settling in grit removal facilities has been considered to be grit.

The amounts reported herein, agree with those reported by others for typical treatment plants.

GRIT REMOVAL

(YEARLY AVERAGE) 1964

PRIMARY PLANTS		Cu. Ft./Mg. (FOR THE YEAR)	Cu. Ft./Mg. (FOR MAX. MO.)
1. BELLEVILLE		1.6	8.6
2. ESPANOLA	*	9.1	50.5
3. FORT ERIE		0.2	0.4
4. FORT WILLIAM	**	1.8	9.4
5. OWEN SOUND		0.9	1.4
6. POINT EDWARD		2.7	6.0
7. PORT ARTHUR		1.7	2.5
8. SAULT STE. MARIE		1.8	3.4
9. TRENTON		3.9	11.2

* BASED ON ESTIMATED FLOW
** BASED ON 6 MONTHS ACTUAL FLOW

SECONDARY PLANTS

10. BRAMPTON			9.0	10.8
11. BRANTFORD			2.8	3.7
12. BURLINGTON D.L.	60-S-51		0.5	2.7
13. BURLINGTON E.G.	58-S-28		5.0	8.5
14. BURLINGTON SKYWAY	62-S-105	*	1.2	4.0
15. CONISTON	58-S-8		6.8	8.2
16. FERGUS	58-S-23		0.9	2.5
17. GALT	61-S-90		0.1	0.1
18. GEORGETOWN	58-S-17		1.4	2.3
19. HUNTSVILLE	58-S-15		4.9	11.3
20. KINGSTON TWP.	61-S-98		0.3	1.7
21. KITCHENER	58-S-19		1.8	3.0
22. LAKEVIEW	59-S-43		0.4	0.7
23. MARKHAM VILLAGE	59-S-40		2.0	6.3
24. MOORE TWP.	61-S-88	**	2.2	2.6
25. NEPEAN TWP.	59-S-35		UNAVAILABLE	UNAVAILABLE
26. NORTH BAY	58-S-10		6.9	9.9
27. ORANGEVILLE	58-S-16		5.4	16.8
28. PORT COLBORNE E.S.			0.8	5.6
29. PORT COLBORNE W.S.	59-S-47			
30. PRESTON	59-S-46		0.4	0.9
31. RICHMOND HILL	57-S-5		UNAVAILABLE	UNAVAILABLE

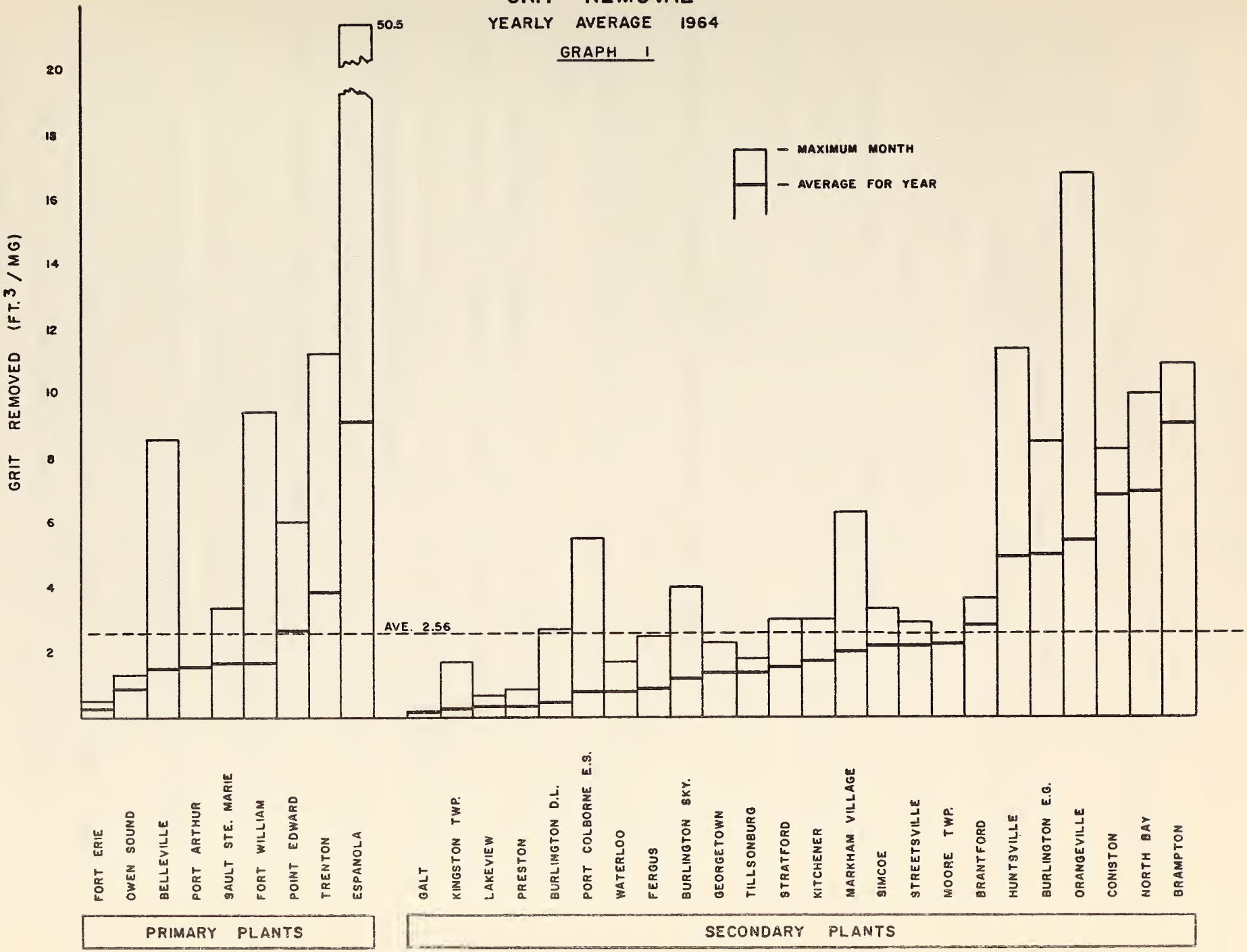
* BASED ON 4 MONTHS ACTUAL FLOWS
** PRO-RATED ON 9 MONTHS ACTUAL FLOWS

32. SIDNEY TWP.	62-S-121	UNAVAILABLE	UNAVAILABLE
33. SIMCOE	62-S-120	2.1	3.4
34. STRATFORD	57-S-2	1.6	3.0
35. STREETSVILLE	57-S-5	2.1	2.9
36. TILLSONBURG	58-S-12	1.4	1.8
37. WATERLOO	58-S-22	0.8	1.7
38. WESTMINISTER	59-S-33	UNAVAILABLE	UNAVAILABLE

GRIT REMOVAL

YEARLY AVERAGE 1964

GRAPH 1



PLANT LOADINGS

HYDRAULIC

The flow data for the primary plants is given in Table No. I and for secondary plants in Table No. II.

Table No. I shows that the Owen Sound, Belleville and Port Arthur plants had an average daily flow greater than design capacity. These three plants represent 38% of our primary plants.

The Owen Sound plant was overloaded 50 percent of the time, and had a maximum daily recorded flow 144 percent above design capacity.

The Belleville plant was overloaded 95 percent of the time and had a maximum daily recorded flow 171.1 percent above design capacity.

The Port Arthur plant was overloaded 67 percent of the time and had a maximum daily recorded flow 100 percent above design capacity.

Table No. II shows that the Brampton-Chinguacousy, Galt, Lakeview, Nepean Township and Sidney Township plants had an average daily flow greater than design capacity.

The Brampton-Chinguacousy plant was overloaded 70 percent of the time and had a maximum daily recorded flow 80 percent above design capacity.

The Galt plant was overloaded 50 percent of the time and had a maximum daily recorded flow 58 percent above design capacity.

The Lakeview plant was overloaded 87 percent of the time and had a maximum daily recorded flow 70 percent above design capacity.

The Nepean Township plant was overloaded 80 percent of the time and had a maximum daily recorded flow 117 percent above design capacity.

The Sidney Township plant was overloaded 100 percent of the time and had a maximum daily recorded flow 230 percent above design capacity.

These 5 hydraulically overloaded plants represent 17% of our secondary plants.

Graph No. 1 indicates the average daily flow of each plant during 1964 as a percent of the design capacity.

TABLE I

O.W.R.C. WATER POLLUTION CONTROL PLANTS

PRIMARY PLANTS

HYDRAULIC, BOD AND SUSPENDED SOLIDS LOADINGS

1964

PROJECT	DESIGN FLOW MGD.	AVERAGE DAILY FLOW MGD.	AVG.DAILY FLOW AS % OF DESIGN	% OF TIME FLOW GREATER THAN DESIGN	MAX.DAILY FLOW RECORDED MGD.	AVG.DAILY FLOW FOR PEAK MTH MGD.	LOADING AS % OF DESIGN		REMARKS
							BOD	S.S	
POINT EDWARD	0.570	.182	32	-0-	.260	.194	44.7	47.2	
ESPANOLA	0.665	.450*	68	-	-	-	22.4	24.4	
TRENTON	1.000	.503	50	9	1.380	.930	38.0	54.0	
FORT ERIE	1.800	1.050	58	17	4.120	1.420	23.2	37.5	
OWEN SOUND	3.000	3.134	104	50	7.320	4.200	52.2	91.9	
BELLEVILLE	3.000	5.136	171	95	8.600	5,830	95.8	247.3	
PORT ARTHUR	4.000	4.510	113	67	7.980	6.300	91.9	101.3	
FORT WILLIAM	6.000	2.240	37	2	8.530	4.100	-	-	No Samples
SAULT STE. MARIE	8.000	6.650	83	23	19.630	10.100	30.2	59.8	

* Estimated

TABLE II

OWRC WATER POLLUTION CONTROL PLANTS

SECONDARY PLANTS

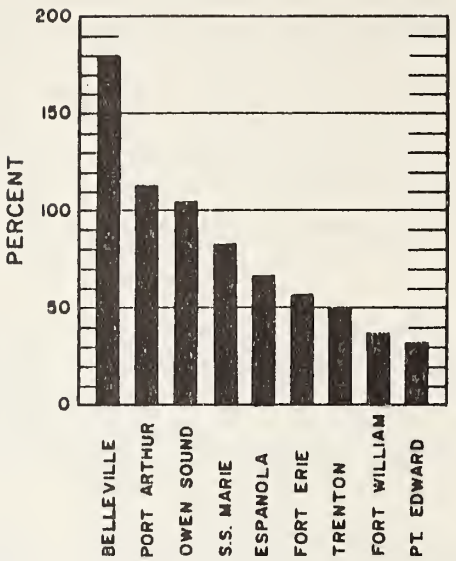
HYDRAULIC, BOD AND SUSPENDED SOLIDS LOADING

1964

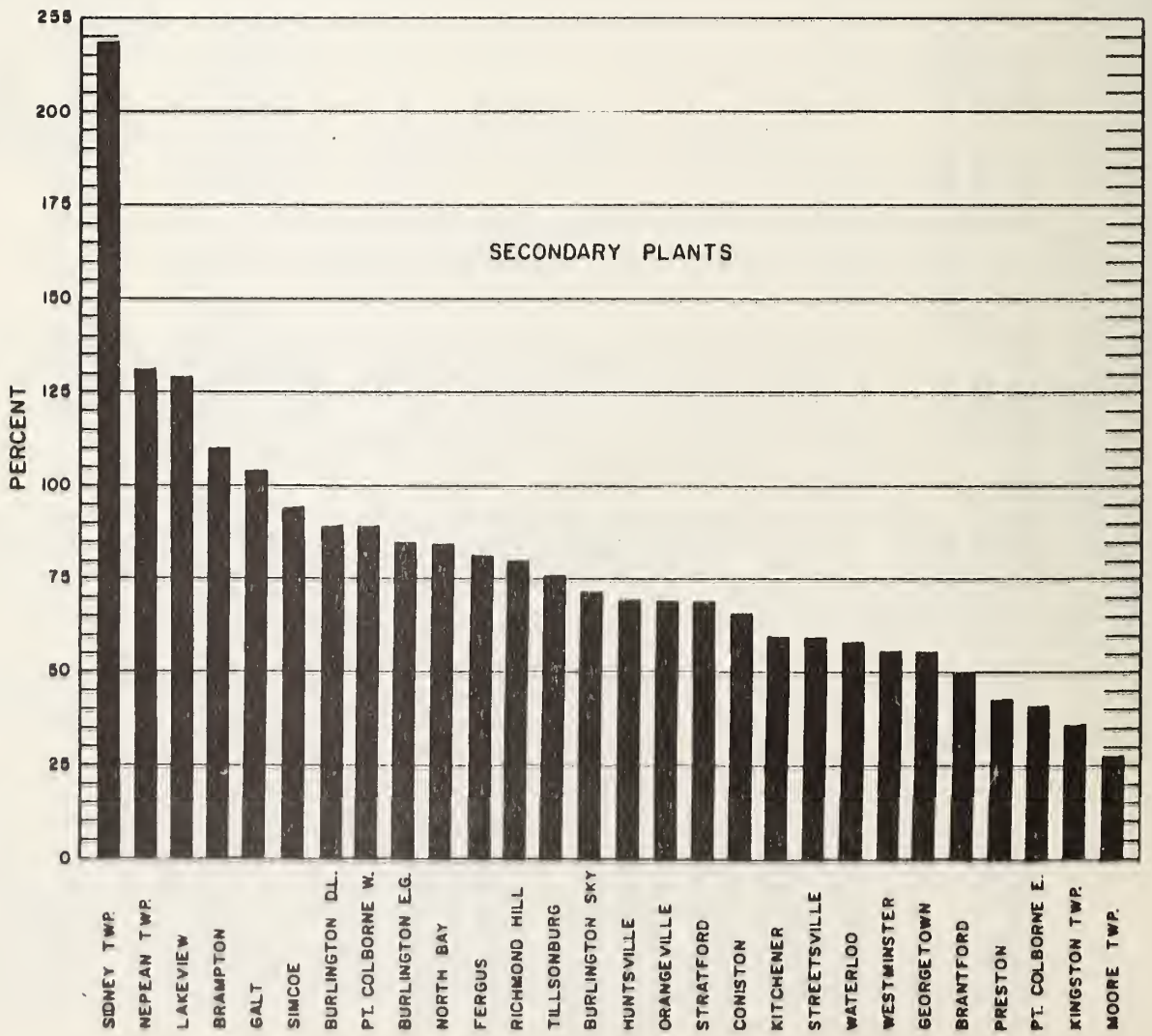
PROJECT	DESIGN FLOW M.G.D	AVERAGE DAILY FLOW M.G.D.	AVG.DAILY FLOW AS % OF DESIGN	% OF TIME FLOW GREATER THAN DESIGN	MAX.DAILY FLOW RECORDED M.G.D.	AVG.DAILY FLOW FOR PEAK MTH M.G.D.	LOADING AS % OF DESIGN BOD	LOADING AS % OF DESIGN SS	REMARKS
Brampton	2.0	2.214	111	70	3.609	2.450	285.3	552.0	
Brantford	12.5	6.070	49	-0-	9.780	8.180	43.3	51.5	
Burlington DL	2.5	2.260	90	45	4.835	3.020	108.9	112.0	
Burlington EG	.75	.645	86	24	2.523	1.210	62.7	62.4	
BurlingtonSKY	3.125	2.240	72	1	3.165	2.280	69.3	87.4	
Coniston	.26	.175	67	1	.303	.198	79.0	63.0	
Fergus	.60	.494	82	22	1.310	.572	118.5	107.4	
Galt	5.0	5.178	104	50	7.899	5.922	57.5	71.2	
Georgetown	1.5	.840	56	2½	2.072	1.124	29.6	40.2	
Kingston Twp.	.83	.310	37	1½	1.000	.491	8.5	9.5	
Huntsville	.25	.173	69	25	.524	.204	37.6	53.6	
Kitchener	13.5	8.300	61	-0-	12.410	9.200	108.0	62.9	
Lakeview	5.0	6.440	129	87	12.420	8.470	163.2	145.3	
Markham Village	.334								No accurate flow data
Moore Twp.	.32	.088	28	-0-	.207	.095	56.9	58.3	
Nepean Twp.	1.5	1.985	132	80	3.252	2.804	79.3	44.8	
North Bay	4.0	3.390	85	24	6.109	4.542	88.2	105.3	
Orangeville	.75	.514	69	7	,847	.710	66.2	49.4	
Port ColborneE	.85	.359	42	-0-	.860	.549	*	*	* No criteria established est. on wwf
Port ColborneW	.90	.804	89	35	1.750	1.080	8.2	7.6	
Preston	1.80	.780	43	-0-	1.296	.923	61.5	67.6	
Richmond Hill	1.60	1.290	81	29	2.629	1.610	77.0	94.0	
Simcoe	1.40	1.326	95	40	1.924	1.610	119.4	77.7	New plant only
Stratford	4.0	2.720	68	22	11.500	4.060	98.0	62.0	
Streetsville	.800	.470	59	3	1.200	.647	78.0	71.0	
Sidney Twp.	.120	.263	219	100	.400	.280	69.2	132.1	
Tillsonburg	.665	.512	77	2	.693	.566	63.0	66.8	
Waterloo	4.000	2.340	58	-0-	3.730	2.580	131.2	113.5	
Westminster	.250	.143	57	3	.276	.198	30.9	35.8	

AVERAGE DAILY FLOW AS PERCENT OF DESIGN FLOW

GRAPH 2



PRIMARY PLANTS



BIOCHEMICAL OXYGEN DEMAND

Graph No. 3 indicates BOD loadings as a percent of design in descending order for both primary and secondary plants.

It can be seen that none of the primary plants is overloaded in BOD, but that seven or 25 percent of the secondary plants receive BOD loadings in excess of design.

SUSPENDED SOLIDS

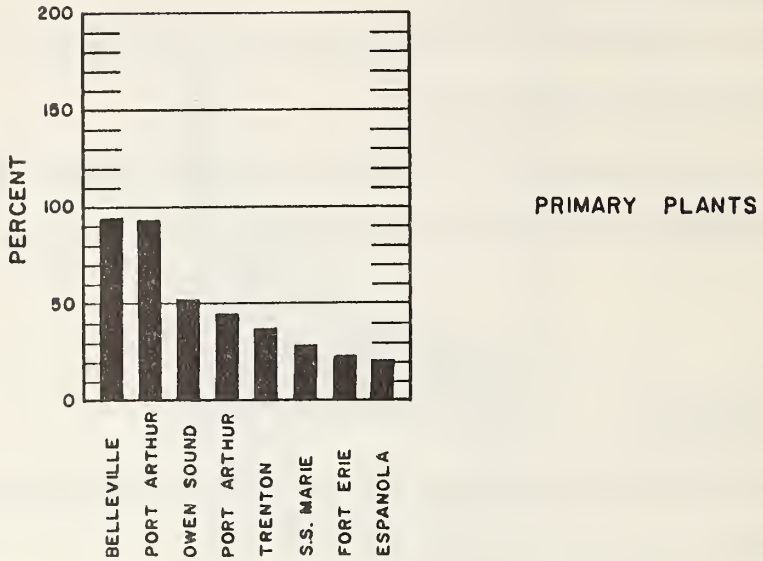
Graph No. 4 indicates SS loadings as a percent of design in descending order for both primary and secondary plants.

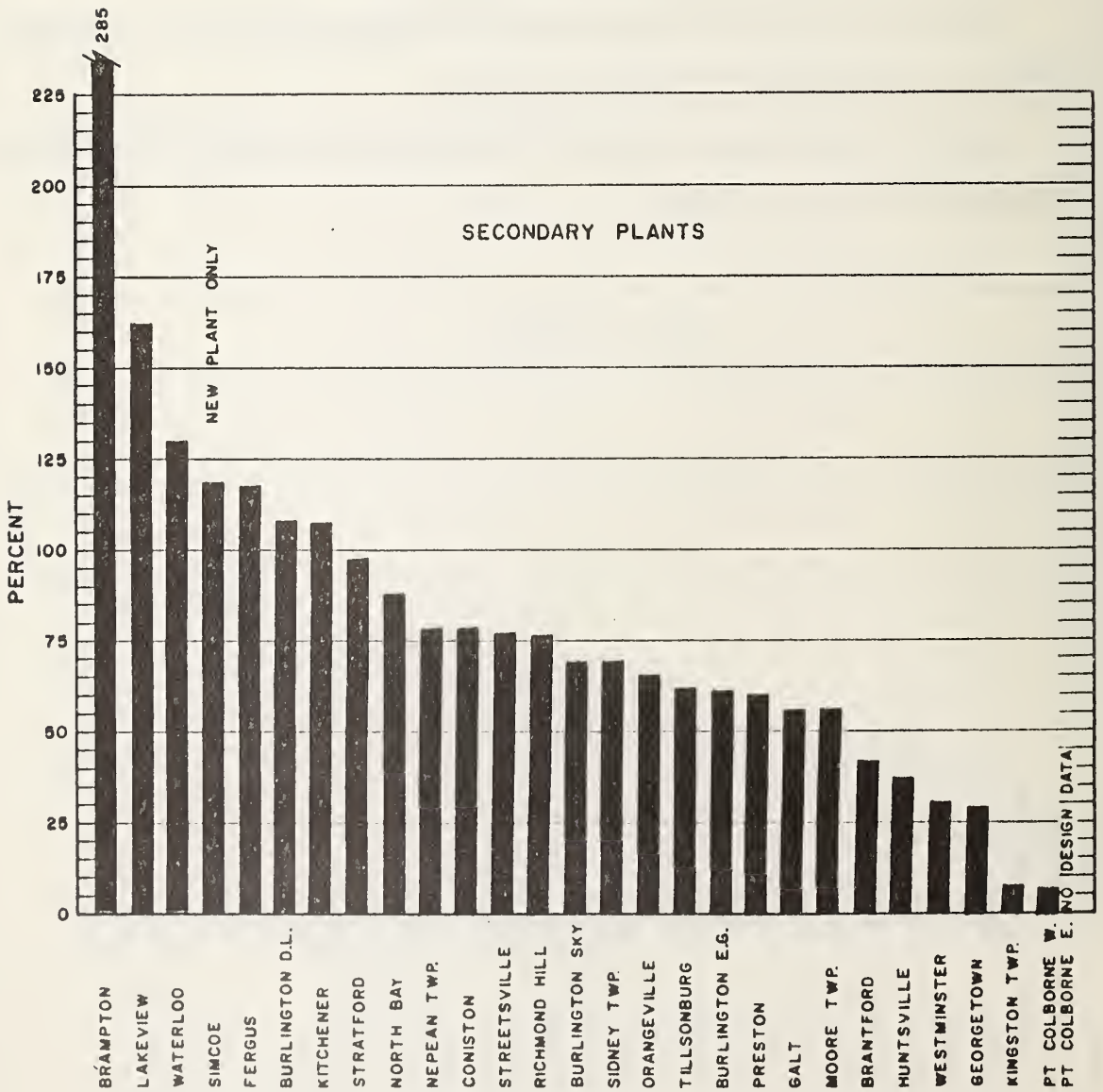
It can be seen that Belleville receives SS loads greatly in excess of design and that the Port Arthur SS loading is at design.

It can be seen that again seven or 25 percent of the secondary plants receive SS loadings in excess of design.

B.O.D. LOADINGS AS PERCENT OF DESIGN

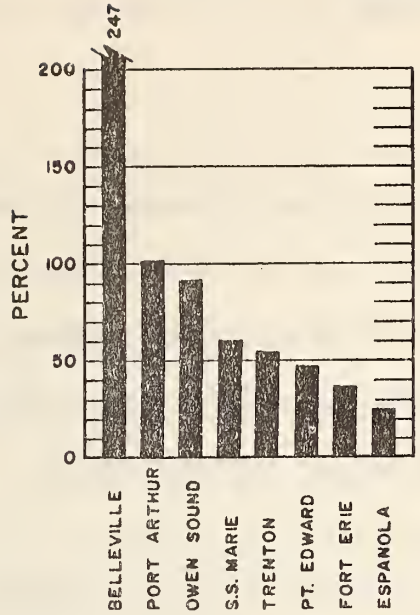
GRAPH 3



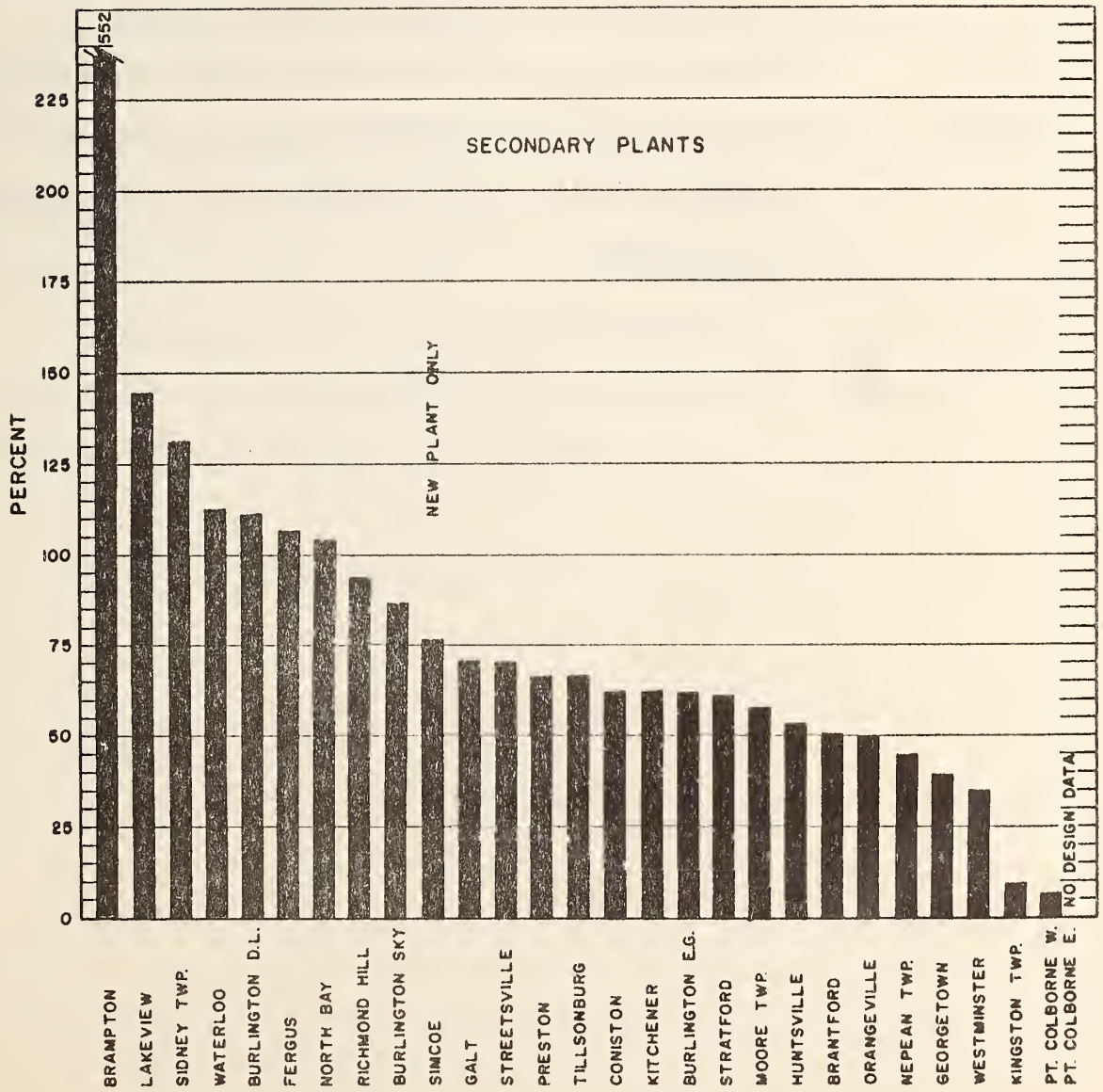


S.S. LOADINGS AS PERCENT OF DESIGN

GRAPH 4



PRIMARY PLANTS



OVERALL LOADINGS

A comparison of the graphs for flow, BOD and SS shows that the following plants are overloaded:

PRIMARY

Belleville - This plant has a very serious hydraulic overloading coupled with an extremely high SS load. The BOD loading is approaching design.

Port Arthur - This plant is at design capacity under all three criteria.

Owen Sound - The Owen Sound plant is at capacity from a hydraulic and SS aspect but its BOD load is only 50 percent of design.

SECONDARY

Sidney Township - This plant has a very serious hydraulic overloading coupled with a high SS loading. The BOD loading is relatively light.

Lakeview - This plant is very seriously overloaded under all three criteria.

Brampton - This plant is hydraulically overloaded and has excessive BOD and SS loadings. The BOD and SS loadings can best be described as fantastically high.

REMOVAL EFFICIENCY

Table No. III is a summary of the 1964 sampling results for all plants having an annual report.

PRIMARY PLANT REMOVALS

The concentrations of BOD and suspended solids of raw sewage and final effluent for all primary plants are shown on Table III and Graph 5. The average removal obtained was 47 percent for BOD and 62 percent for suspended solids compared to 45 and 64 percent for 1963. These efficiencies are above normally anticipated values of 25 to 35 percent for BOD and 50 to 60 percent for suspended solids.

The lowest efficiency of BOD removal was experienced at Point Edward (34%) and the highest at Belleville (62%). The lowest efficiency of suspended solids removal was noted at Fort Erie (39%) and the highest at Point Edward (78%).

The average reduction of BOD and suspended solids at secondary plants was 92 and 90 percent respectively. This is consistent with results experienced by others and agrees with those noted for 1963.

TABLE III

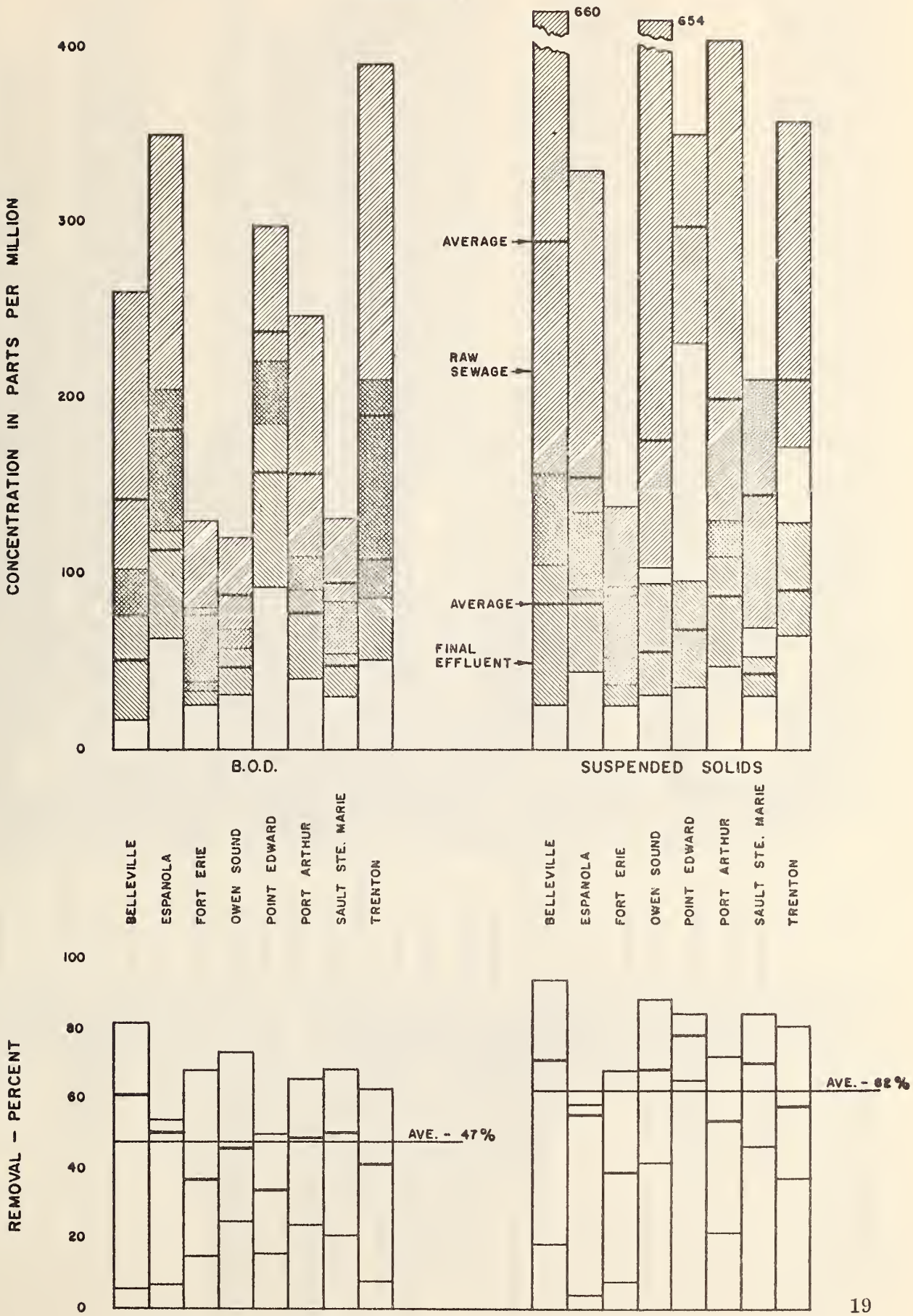
REMOVAL EFFICIENCY

PROJECT	BIOCHEMICAL OXYGEN DEMAND									SUSPENDED SOLIDS								
	RAW PPM			FINAL PPM			REMOVAL %			RAW PPM			FINAL PPM			REMOVAL %		
PRIMARY	MAX	MIN	AV.	MAX	MIN	AV.	MAX	MIN	AV.	MAX	MIN	AV.	MAX	MIN	AV.	MAX	MIN	AV.
1. BELLEVILLE	260	76	140	102	18	54	81	6	62	660	104	289	158	24	82	93	18	72
2. ESPANOLA	350	125	181	205	62	115	54	7	54	329	90	155	134	42	83	59	4	59
3. FORT ERIE	130	34	76	78	28	37	68	15	37	138	24	84	88	38	51	68	7	39
4. FORT WILLIAM	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5. OWEN SOUND	120	57	86	66	32	46	73	26	45	654	102	176	96	30	57	88	42	68
6. POINT EDWARD	295	185	238	220	92	157	50	16	34	352	232	296	95	36	66	84	66	78
7. PORT ARTHUR	245	90	147	114	40	77	66	24	48	404	112	198	128	44	87	72	21	56
8. SAULT STE MARIE	130	54	95	82	32	47	68	20	50	210	68	144	53	36	43	84	47	70
9. TRENTON	390	86	189	210	51	109	62	8	42	358	172	212	127	64	91	80	37	57
AVERAGE	240	88	144	135	44	80	65	15	47	388	113	194	110	39	70	78	30	62
SECONDARY																		
10. BRAMPTON	1360	295	567	114	9	31	98	88	94	2444	432	940	80	9	30	99	90	97
11. BRANTFORD	250	100	154	58	3	18	98	52	88	256	124	182	36	5	18	97	86	90
12. BURLINGTON DL	400	90	242	51	3	17	99	84	93	346	156	249	88	5	20	98	65	92
13. BURLINGTON EG	460	50	161	51	3	18	99	48	89	396	60	182	15	1	7	99	84	96
14. BURLINGTON SKY	470	95	195	9	2	4	99	91	98	404	106	246	21	1	12	99	80	95
15. CONISTON	460	106	229	54	10	29	93	82	88	552	102	226	84	18	47	90	57	79
16. FERGUS	1060	54	289	29	5	14	98	80	95	878	116	262	43	5	19	99	73	92
17. GALT	280	74	139	46	2	12	98	71	91	494	108	172	40	1	15	99	72	91
18. GEORGETOWN	210	63	106	46	3	14	97	52	86	254	116	180	22	2	12	98	83	94
19. HUNTSVILLE	190	46	136	20	1	6	99	78	95	818	76	194	42	2	14	99	63	92
20. KINGSTON TWP.	112	34	109	25	7	10	94	26	91	137	42	114	30	10	14	91	60	88
21. KITCHENER	1140	270	451	45	4	20	99	90	96	576	268	394	40	4	20	99	90	95
22. LAKEVIEW	730	130	285	300	7	54	98	16	81	768	140	282	350	9	71	97	5	74
23. MARKHAM VILL.	610	136	264	78	8	22	98	42	92	948	152	382	114	8	45	98	42	88
24. MOORE TWP.	280	125	203	27	4	11	98	84	94	388	124	208	61	8	25	96	72	88
25. NEPEAN TWP.	620	22	84	53	5	23	92	4	72	172	38	100	96	2	43	94	12	57
26. NORTH BAY	240	88	157	42	3	15	97	60	90	694	120	250	38	4	14	98	68	94
27. ORANGEVILLE	315	110	194	145	65	101	74	12	48	288	94	181	88	36	57	84	40	66
28. PORT COLBORNE ES	300	44	108	30	5	14	97	50	87	532	60	142	77	3	21	98	26	85
29. PORT COLBORNE WS	205	30	83	21	3	8	97	60	90	486	32	103	16	1	6	99	78	94
30. PRESTON	550	245	428	47	4	17	99	87	96	948	232	549	47	2	13	99	87	96
31. RICHMOND HILL	780	50	190	37	4	14	99	72	92	1484	71	256	41	1	16	99	68	94
32. SIDNEY TWP.	136	12	72	10	3	6	96	46	91	400	25	156	66	6	26	94	54	84
33. SIMCOE	600	135	311	26	3	10	99	89	97	482	152	229	60	2	13	99	68	94
34. STRATFORD	500	96	201	28	3	10	98	86	95	462	118	230	44	1	10	99	84	96
35. STREETSVILLE	660	100	318	11	2	6	99	95	98	484	210	311	16	3	8	99	93	98
36. TILLSONBURG	315	135	212	24	2	10	99	86	95	400	126	231	56	2	14	99	80	94
37. WATERLOO	1220	185	676	570	7	98	96	32	86	1152	86	526	602	10	89	98	1	83
38. WESTMINISTER	320	48	135	25	2	7	99	60	95	808	60	250	114	5	29	99	16	88
AVERAGE	508	101	230	58	4	17	98	66	92	644	123	269	74	4	22	98	65	90

LAKEVIEW AND ORANGEVILLE HAVE BEEN OMITTED FROM AVERAGE. DURING 1964 THESE PLANTS NOT GIVING FULL SECONDARY TREATMENT.

BIOCHEMICAL OXYGEN DEMAND AND SUSPENDED SOLIDS REMOVALS

GRAPH 5

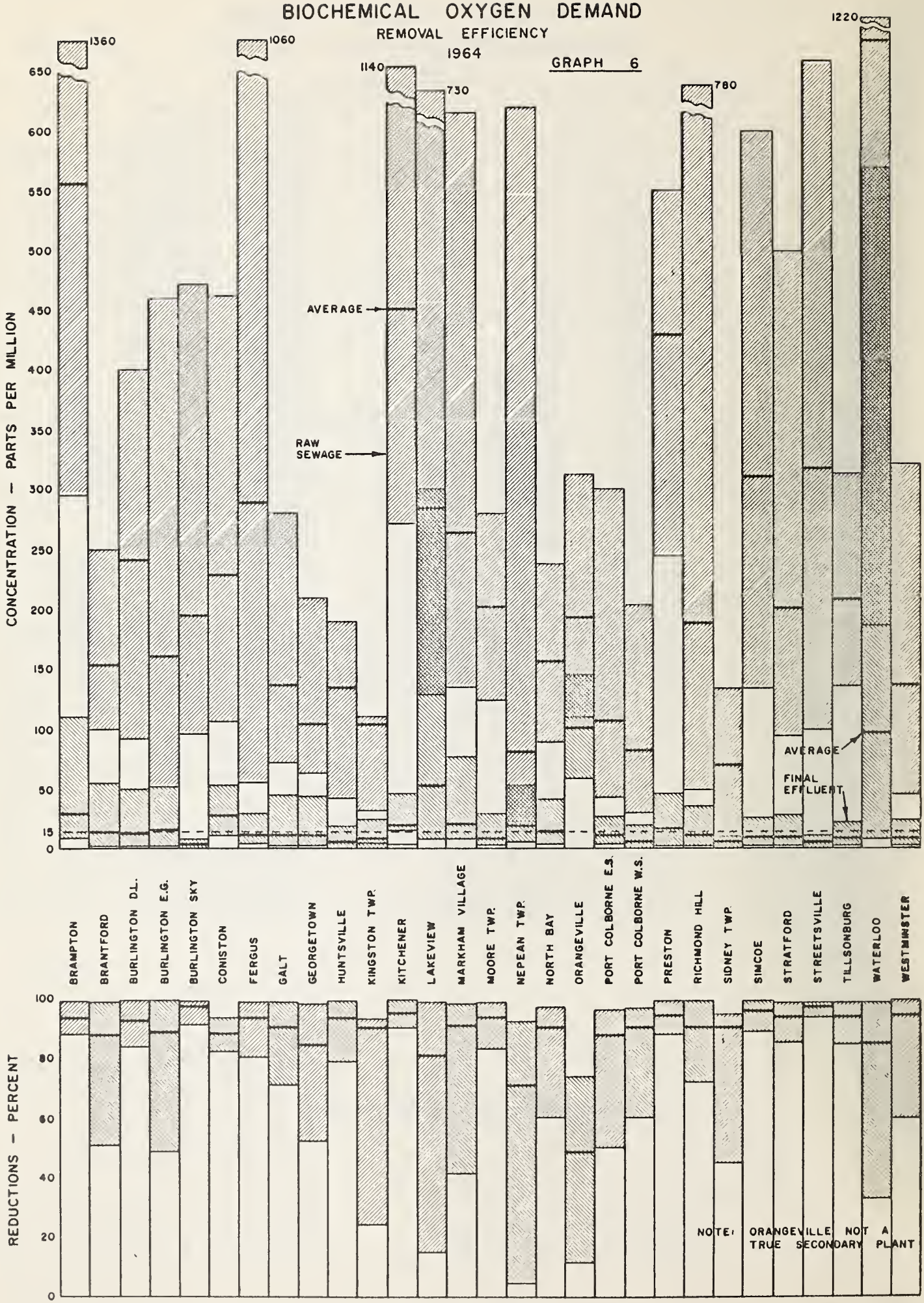


BIOCHEMICAL OXYGEN DEMAND

REMOVAL EFFICIENCY

1964

GRAPH 6

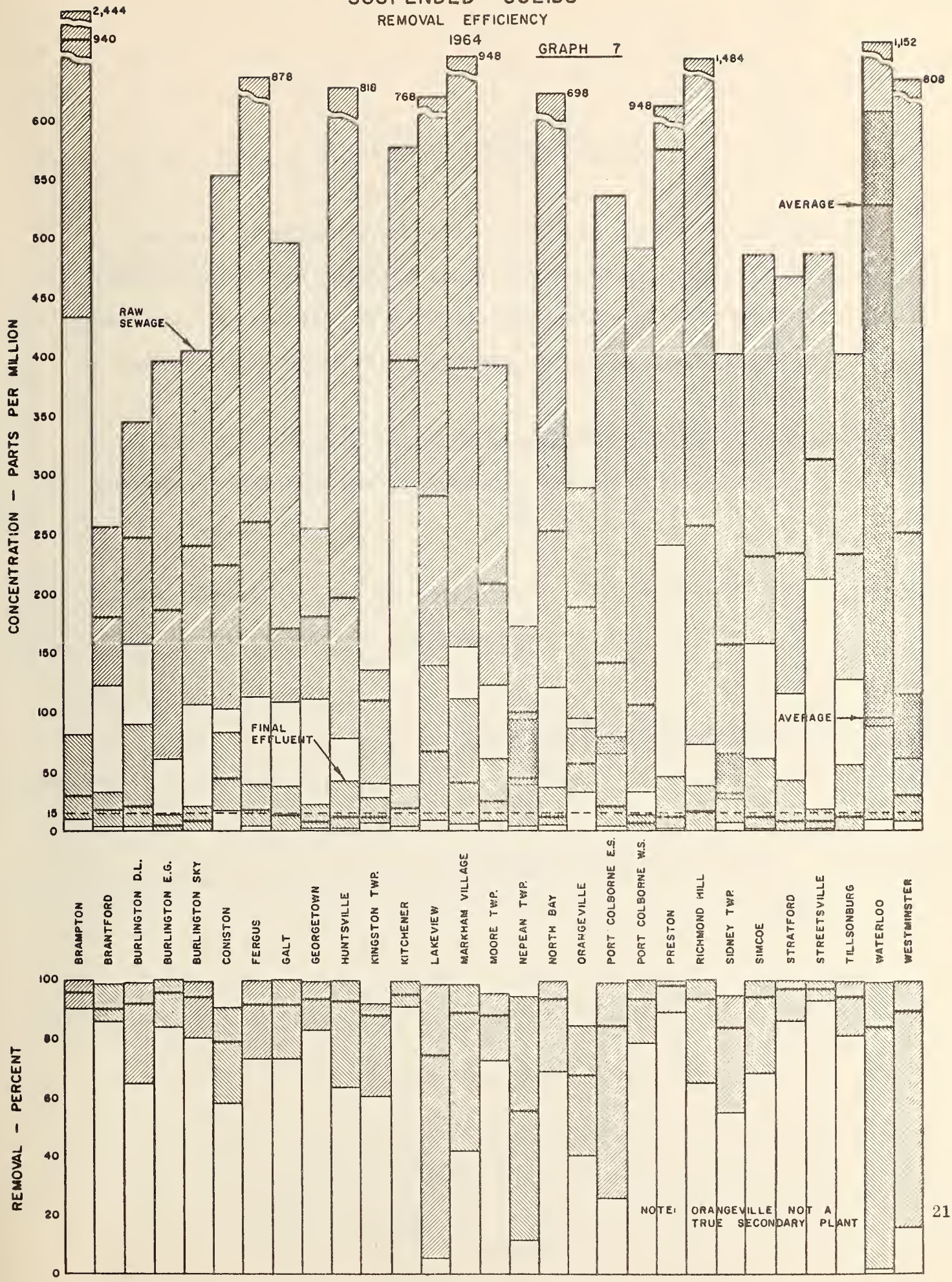


SUSPENDED SOLIDS

REMOVAL EFFICIENCY

1964

GRAPH 7



AERATION TANK PERFORMANCE

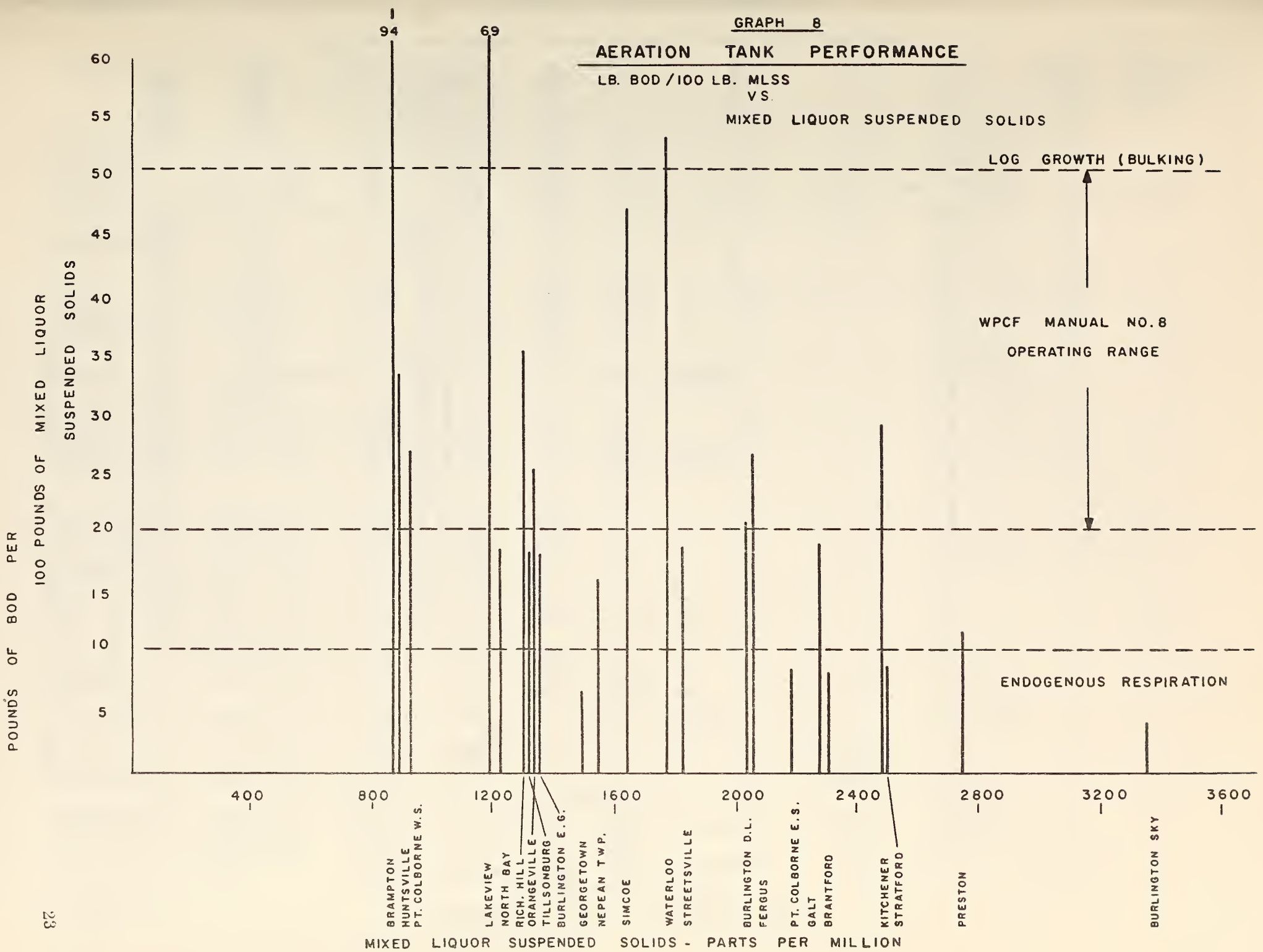
The loading applied to the aeration sections of the treatment plants is shown on Graph 8 . The aeration sections of three plants (Brampton, Lakeview and Waterloo) were loaded beyond the 50 pounds of BOD, per 100 pounds of mixed liquor suspended solids figure. Expansion of all three of these plants is presently being planned or under construction.

Most of the plants experienced loadings on the aeration section below the ratio of 20 and as a result more air was used than is theoretically required for the amount of BOD reduced. This is shown on Graph 9 .

GRAPH 8

AERATION TANK PERFORMANCE

LB. BOD / 100 LB. MLSS
VS.
MIXED LIQUOR SUSPENDED SOLIDS



AERATION TANK PERFORMANCE

DIFFUSED AIR PLANTS

CU. FT. OF AIR / LB. B.O.D. REMOVED

VS.

LB. B.O.D. / 100 LB. M.L.S.S.

GRAPH 9

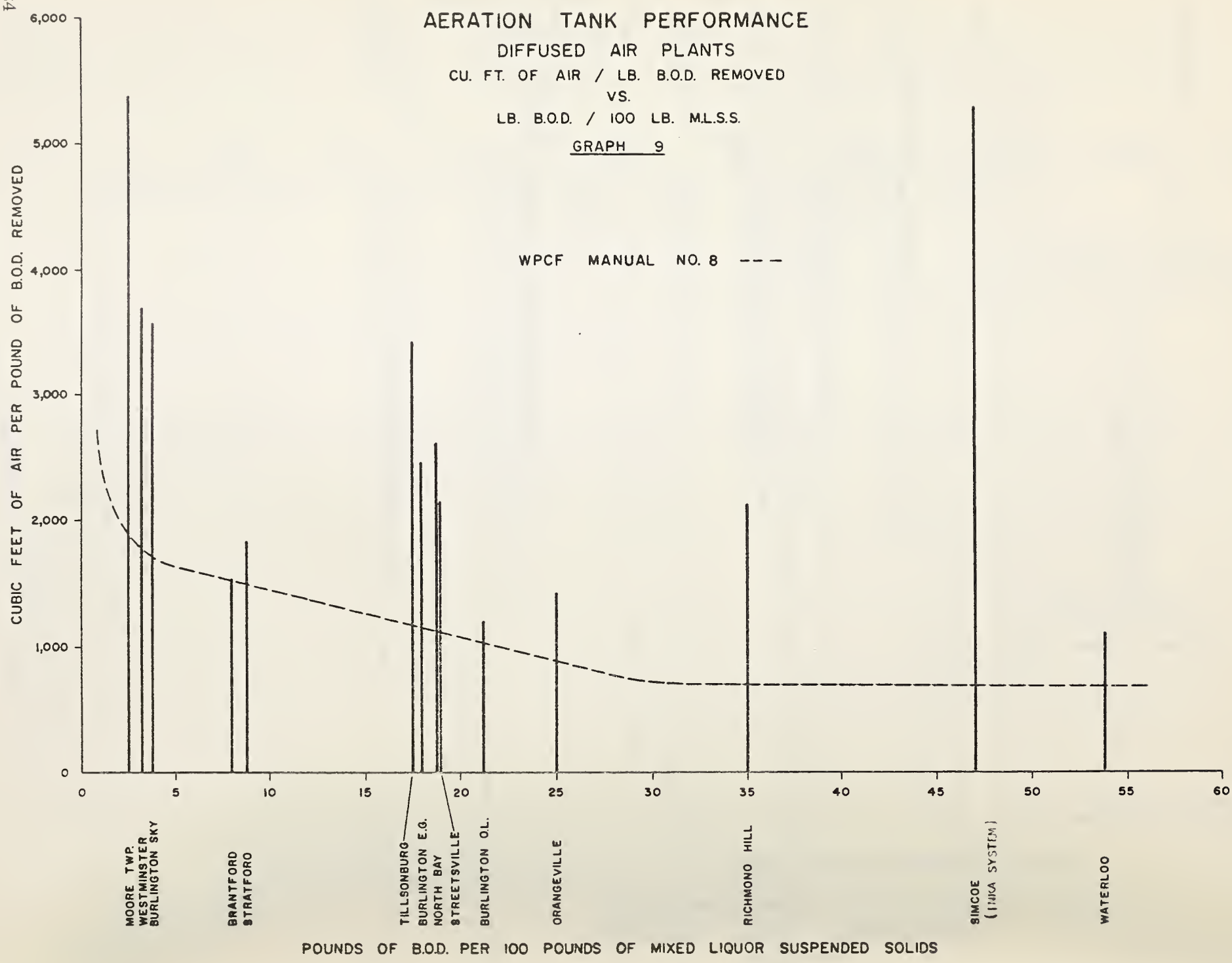


TABLE IV

AERATION TANK PERFORMANCE

Project	Type	Design Flow MGD	Actual Flow MGD	MLSS	Prim. Eff. BOD ppm	lbs. BOD 100 lbs. MLSS	ft.^{3} Air lbs. BOD Rem.	Diffuser Type	Detention Design Hrs.	Detention At Max. Mo. Flow 25% Return
Brampton	Single Pass	2.000	2.214	865	203	94	822	Diffusers	10.2	6.7
Brantford	Triple Pass	12.500	6.070	2305	110	8	1524	Sparjers	6	-
Burlington DL	Triple Pass	2.500	2.260	2020	150	21	1231	Diffusers	6.0	5.0
Burlington EG	Single Pass	0.750	0.645	1349	114	18	2487	Coliflex Diffusers	6	4.3
Burlington SKY	TO	3.125	2.240	3344	195	4	3534	1500 - Ceramic	31.7	-
Fergus	Mech. aera.	0.600	0.494	2040	178	26	-	A. C. 3	4.4	-
Galt	Mech. aera.	5.000	5.192	2369	108	19	-	A. C. 20per	7.0	5.8
Georgetown	Mech. aera.	1.500	0.840	1493	68	7	-	A. C. 8	8.0	-
Huntsville	Mech. aera.	0.250	0.173	887	143	33	-	Chicago Pump 2	6.75	6.12
Kingston Twp.	Single Pass	0.83	0.310	No Data Available				C. P. Disc-- ffusers	7.5	-
Kitchener	Mech. aera.	13.500	8.260	2497	266	29	-	A. C. 56	5.85	-
Lakeview	Three Pass	5.000	6.445	1190	202	69	1209	Sparjers	6.0	4.3
Markham Vill.	Single Pass	0.334	0.230*	No Data Available				Sparjers	6.06	-
Moore Twp.	TO	0.320	0.088	5517	203	2	5332	C. P. - Sparjers	24.0	-
Nepean Twp.	Mech. aera.	1.500	1.985	1536	47	16	-	A. C. 6	5.4	2.9
North Bay	Single Pass	4.000	3.390	1223	68	19	2598	Diffusers	5.31	4.6
Orangeville	Single Pass	0.750	0.514	1355	143	25	1468	Diffusers	2.14**	-
Port Colborne - ES	Mech. aera-tion	0.850	0.359	2188	108	8	-	A. C. 4	6.0	-
Port Colborne - WS	Mech. aera-tion	0.900	0.804	920	44	26	-	A. C. 6	6.7	5.8
Preston	Mech. aera.	1.800	0.780	2743	196	12	-	A. C. 6	9.7	-
Richmond Hill	Single Pass	1.000	1.290	1300	105	35	2143	Carbon-Diffuser	5.9	5.7
Sidney Twp.	Single Pass	0.125	0.280	No Data Available				Ceramic-Diffuser	6.0	2.6
Simcoe	Single Pass	2.000	1.326	1631	195	47	5244	-	7.68	-
Stratford	Single Pass	4.000	2.720	2496	89	9	1894	Dome-Diffuser	5.7	4.6
Streetsville	Single Pass	0.800	0.470	1858	215	19	2115	Diffuser	6.1	-
Tillsonburg	Single Pass	0.665	0.512	1318	136	18	3458	Sparjers	10.1	-
Waterloo	Bisorbtion	4.000	2.340	1780	592	54	1077	Sparjers	7.2	-
Westminister	TO	0.250	0.143	4624	135	3	3700	-	24.2	-

* Estimated

** Cannot calculate since do not know return sludge rate.

CHLORINATION

The chlorine dosages experienced at various plants are shown in Table V and Graph 10 .

In general the actual dosages agreed with those suggested in the WPCP Manual of Practise No. 8. However, very high dosages were experienced at Fort William, Point Edward and Trenton. The dosage at Point Edward was high as a result of low flows and the difficulty of maintaining a chlorine dosage matched to the low flow.

GRAPH 10

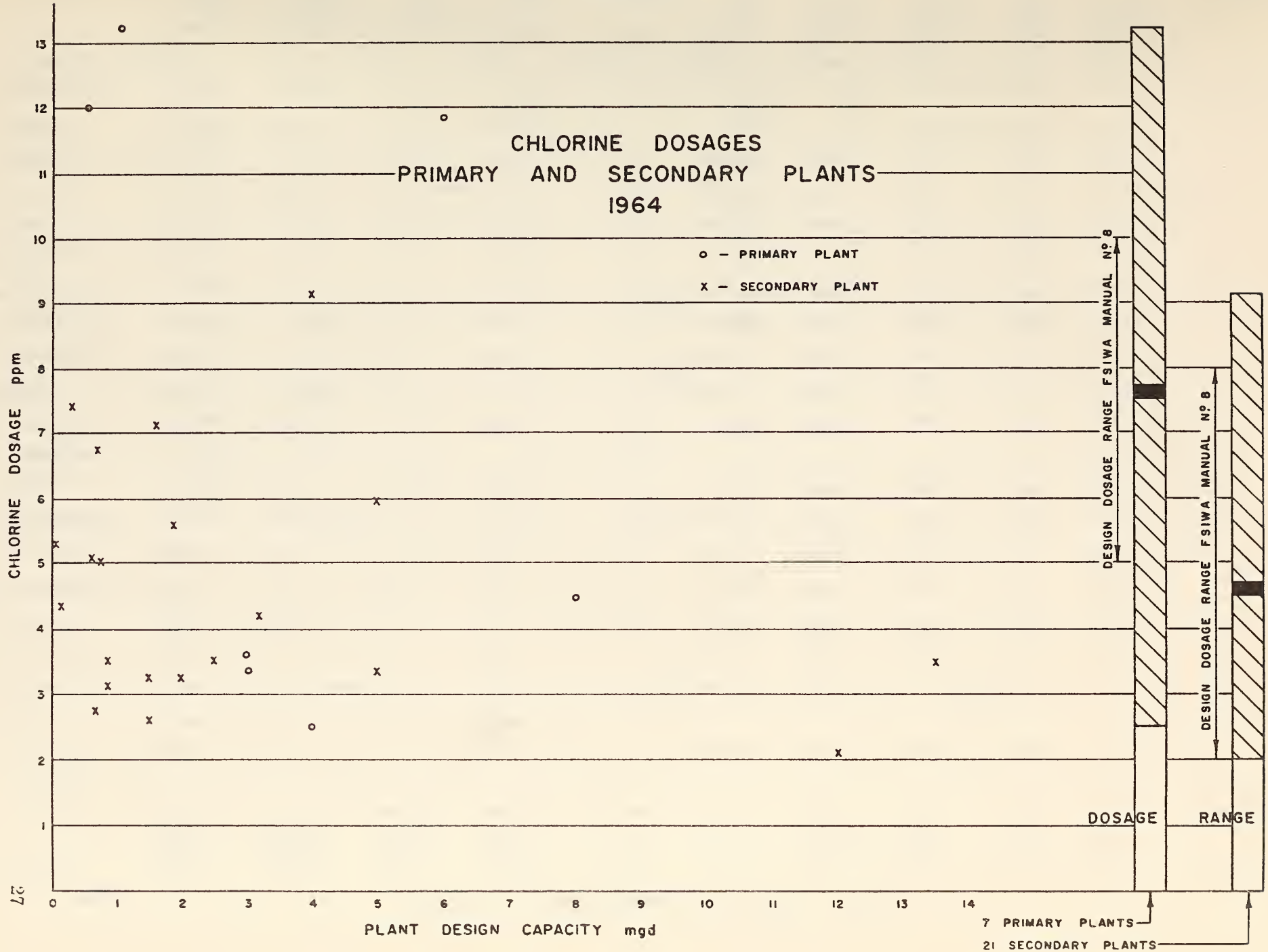

CHLORINE DOSAGES
PRIMARY AND SECONDARY PLANTS
1964
o — PRIMARY PLANT
x — SECONDARY PLANT
DESIGN DOSAGE RANGE FSIWA MANUAL Nº 8
DESIGN DOSAGE RANGE FSIWA MANUAL Nº 8
DOSAGE
RANGE
CHLORINE DOSAGE ppm
PLANT DESIGN CAPACITY mgd
7 PRIMARY PLANTS
21 SECONDARY PLANTS

TABLE V

SUMMARY CHLORINATION DATA 1964

PROJECT	DESIGN FLOW MGD	DESIGN RETENTION (MINS)	MONTHS OF CHLORINE	AV. DAILY FLOW MGD	AV. RETN. (MINS)	TOTAL FLOW MG	TOTAL CHLORINE LBS.	MAX. CL DOSAGE PPM	MIN.CL. DOSAGE PPM	AV. CL. DOSAGE PPM	COMMENTS
PRIMARY											
BELLEVILLE	3.000	31	5	5.30	18	1879.68	30114	4.04	3.49	3.73	
ESPANOLA	0.665	-	-	0.45					N A		FLOW ESTIMATED
FORT ERIE	1.800	13.4 + OUTFALL	6	1.05	23 + OUTFALL	512.92	8781		N A		
FORT WILLIAM	6.000	-	3	2.15	-	819.84	28045	15.49	11.88	13.28	
OWEN SOUND	3.000	11.2	7	3.15	10.7	1147.207	20019	3.94	2.39	3.34	
POINT EDWARD	0.570	27	12	0.18	85	66.626	7647	13.48	10.65	12.43	
PORT ARTHUR	4.000	20	6	4.40	18	1648.94	22590	2.93	1.97	2.50	
SAULT STE. MARIE	8.000	1.5 + OUTFALL	7	6.50	1.8 + OUTFALL	2432.62	53824	5.80	2.92	4.76	
TRENTON	1.000	37	8	0.50	74	184.23	10628	17.44	6.14	13.28	
SECONDARY											
BRAMPTON	2.000	15	12	2.2	14	810.463	26223	4.34	1.85	3.24	
BRADFORD	12.500	5+ OUTFALL	5	6.07	10 + OUTFALL	2220.60	17079	2.40	0.64	2.03	
BURLINGTON D.L.	2.500	-	12	2.26	-	823.798	29161	4.56	2.86	3.54	
BURLINGTON E.S.	0.750	10 + OUTFALL	12	0.64	12 + OUTFALL	235.486	6452	4.54	1.74	2.74	
BURLINGTON SKY.	3.125	-	2	2.24	-	271.006	5952	4.98	3.63	4.30	4 MONTHS' DATA
CONISTON	0.260	10	-	0.18					N A		
FERGUS	0.600	15	12	0.49	18	180.124	9153	8.14	2.40	5.08	
GALT	5.000	13.2	12	5.19	13	1895.161	65160	3.80	2.82	3.44	
GEORGETOWN	1.500	26	12	0.84	46	307.116	10325	4.49	2.42	3.36	
HUNTSVILLE	0.250	36	-	0.17					N A		
KINGSTON TWP.	0.830	18	-						N A		
KITCHENER	13.500	15	12	8.30	24	3026.52	107696	4.69	2.69	3.56	
LAKEVIEW	5.000	50	12	6.44	39	2358.770	147184	7.32	5.12	6.24	

PROJECT	DESIGN FLOW MGD	DESIGN RETENTION (MINS)	MONTHS OF CHLORINE	AV. DAILY FLOW MGD	AV. RETN. (MINS)	TOTAL FLOW MG	TOTAL CHLORINE LBS.	MAX.CL. DOSAGE PPM	MIN.CL. DOSAGE PPM	AV. CL. DOSAGE PPM	COMMENTS
SECONDARY (CONT'D)											
MARKHAM VILLAGE	0.334	52	8	0.23	75	84.180	2457	5.41	2.17	4.49	FLOW ESTIMATED
MOORE TWP.	0.320	-	6	0.09	-	32.020	978	8.90	6.80	7.40	
NEPEAN TWP.	1.500	17	6	1.98	13	726.411	7385	3.50	2.22	2.69	
NORTH BAY	4.000	25	6 (APP)	3.39	29	1234.328					
ORANGEVILLE	0.750	29.6	12	0.51	43.5	187.373	12505	8.51	4.68	6.67	
PORT COLBORNE WS	0.900	16	12	0.80	18	294.212	9064	6.37	1.87	3.08	
PRESTON	1.800	15	12	0.78	35	284.326	15965	9.43	3.50	5.62	
RICHMOND HILL	1.600	11.3	12	1.29	14	472.211	34026	9.35	5.61	7.21	
SIDNEY TWP.	0.125	20	-	0.28			N A				
SIMCOE	2.000	16.4	-	1.33			N A				
STREETSVILLE	0.800	20	9	0.47	34	172.302	3210	5.11	2.18	3.50	
TILLSONBURG	0.665	30.2	6	0.51	39.4	187.461	3738	5.68	4.34	5.00	
WATERLOO	4.000	-	12	2.34	-	852.937	79064	11.75	5.94	9.27	
WESTMINSTER	0.250	22.7	5	0.14	40.5	52.469	1330	6.09	4.76	5.26	

NA - NOT AVAILABLE

DIGESTER OPERATION

As can be seen from the tables and graphs pertaining to digester operation, limited data is available. Much of the data provided is questionable with regard to its accuracy, partly due to the infrequent sampling and partly due to probable inaccuracies in meters.

Of the thirty plants utilizing digestion facilities only two provided all of the information required for a proper analysis of the performance. With regard to solids measurements, it was possible to obtain material balances (within 10 percent) on only six installations. This makes it difficult to place much confidence in the loading figures determined from the information supplied.

As indicated on Graph. 12 none of the digestion systems were designed for loadings in excess of those recommended in the WPCF Manual No. 8 although the actual loadings on the Owen Sound, Brampton and Brantford digesters were above this. In addition the design loadings on the primary digesters were in excess of the manuals recommendation at Brampton, Kitchener and Lakeview and the actual loadings were in excess of these recommendations at Owen Sound, Brampton, Brantford, Kitchener and Lakeview.

The effect of digester loading on digestion is shown on Graph. 13 . This graph is not complete in that only seven plants are shown and this reflects the lack of information available. However, with the exception of the Point Edward unit it is indicated that the volatile content of the digested sludge increased with an increase in the load on the digester. It is noted in the WPCF Manual No. 9 that a well digested sludge should have a volatile content of approximately 50 percent or less. Based on this criteria and the loadings experienced at Kitchener, Lakeview and Brantford; a well digested sludge was not produced at these plants.

Although the loading at Point Edward was not high the volatile content of the raw sludge was above normal and this may in part account for the high volatile content of the digested sludge. Also, the temperature maintained at the digester and the amount of mixing employed should be reviewed.

In general it is necessary to review the sampling program and the metering associated with the digestion process at the various plants if reliable information is to be obtained.

TABLE VI

SUMMARY OF 1964 DIGESTER PERFORMANCE

	PROJECT	REMARKS	TYPE	DESIGN FLOW (MGD)	DESIGN LOADING PRIMARY (FT^3/CAP)	DESIGN LOADING PRIMARY (LB/FT^3/DAY)	DESIGN LOADING TOTAL (FT^3/CAP)	DESIGN LOADING TOTAL (LB/FT^3/DAY)	ACTUAL LOADING PRIMARY (FT^3/CAP)	ACTUAL LOADING PRIMARY (LB/FT^3/DAY)	ACTUAL LOADING TOTAL (FT^3/CAP)	ACTUAL LOADING TOTAL (LB/FT^3/DAY)	RESULTS REDUCTION TS	REDUCTION VS	REDUCTION VOL.	VOLATILE CONTENT DIG. SLUDGE %	GAS PRODUCTION FT^3/LB VS FEED	GAS PRODUCTION FT^3/LB VS RED
1		A	P2D	3.0	1.33	0.127	2.65	0.063	1.25	0.069	2.55	0.035	-	-	-	-	-	-
2		C	P1D	0.665	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3		B	P2D	1.800	1.30	0.092	2.56	0.046	-	-	-	-	-	-	-	-	-	-
4		B	P2D	6.00	1.48	0.100	2.96	0.050	-	-	-	-	-	-	-	-	-	-
5		B	P2D	3.00	1.26	0.125	2.48	0.063	1.75	0.366	3.55	0.183	-	-	-	-	-	-
6		B,D	P1D	0.570	2.66	0.038	2.66	0.038	4.85	0.013	4.85	0.013	44.5	57	84	62	-	-
7		E	P1D	4.00	1.25	0.067	1.25	0.067	1.12	0.032	1.12	0.032	-	-	-	-	-	-
8		NO DIGESTION TANKS																
9		B,F	P2D	1.00	1.13	0.088	2.25	0.044	-	0.038	-	0.019	59	76	85	44	-	-
10		B	AS2D	2.00	1.67	0.156	3.33	0.078	-	0.30	-	0.15	-	-	-	-	-	-
11			AS2D	12.50	1.50	0.205	4.50	0.103	1.3	0.287	3.9	0.144	24.2	38.8	4.2	58.1	5.7	15.1
12		A,B,F	AS2D	2.50	1.67	0.10	2.41	0.069	-	0.074	-	0.051	33	49	34	49	-	-
13		B	AS1D	0.75	4.20	0.053	4.20	0.053	-	-	-	-	-	-	17	-	-	-
14		NO DIGESTION TANKS																
15		A,B,F	AS2D	0.260	2.43	0.054	2.74	0.047	2.27	0.053	2.56	0.047	-	-	TRACE	-	-	-
16		A,B,F	AS1D	0.600	4.80	0.047	4.80	0.047	5.6	-	5.6	-	-	-	-	-	-	-
17		DIGESTERS NOT IN USE																
18		A,B	AS2D	1.50	5.2	0.037	6.60	0.027	6.7	-	8.5	-	-	-	-	-	-	-
19		A	AS1D	0.25	5.0	0.040	5.0	0.040	5.0	0.15	5.0	0.15	43	-	23	-	-	-
20		A	AS1D	.830	5.5	0.034	5.5	0.034	-	-	-	-	-	-	-	-	-	-
21		A,B	AS2D	13.50	1.44	0.326	5.44	0.086	1.2	0.181	4.5	0.049	23	35	-	57	-	-
22		A,B	AS2D	5.00	1.64	0.154	3.28	0.077	-	0.209	-	0.105	29	38	-	64.5	-	-
23			AS1D	0.334	8.80	0.022	8.80	0.022	-	0.023	-	0.023	-	-	82	-	-	-
24		NO DIGESTION TANKS																
25		B	AS1D	1.50	4.00	0.067	4.00	0.067	-	-	-	-	-	-	64.2	-	-	-
26		B	AS2D	4.00	1.40	0.081	2.90	0.038	-	0.073	-	0.035	56	-	60	-	-	-
27		NO HEATED DIGESTER																
28		A,B	AS1D	0.850	5.28	0.053	5.28	0.053	-	0.019	-	0.019	-	-	71	-	4.9	-
29			AS2D	0.900	2.34	0.117	3.83	0.073	-	0.018	-	0.011	-	-	28	-	10.6	-
30		NO DIGESTION TANKS																
31		B	AS2D	1.60	2.44	0.085	3.28	0.022	2.0	0.077	2.7	0.02	50	-	47.7	-	-	-
32		B	AS1D	0.125	4.00	0.030	4.00	0.030	-	-	-	-	-	-	-	-	-	-
33		B	AS2D	2.00	2.80	0.096	5.60	0.048	3.08	-	6.13	-	-	-	63.8	-	-	-
34			AS2D	4.00	2.25	0.062	3.30	0.042	2.98	0.065	4.34	0.044	37	40	NIL	56	5.10	13.0
35		B	AS1D	0.800	4.50	0.050	4.50	0.050	6.2	0.04	6.2	0.04	-	-	74	-	-	-
36		A,B	AS1D	0.665	5.14	0.046	5.14	0.046	5.4	0.030	5.4	0.030	-	-	-	-	-	-
37		NO DIGESTION																
38		NO DIGESTION																

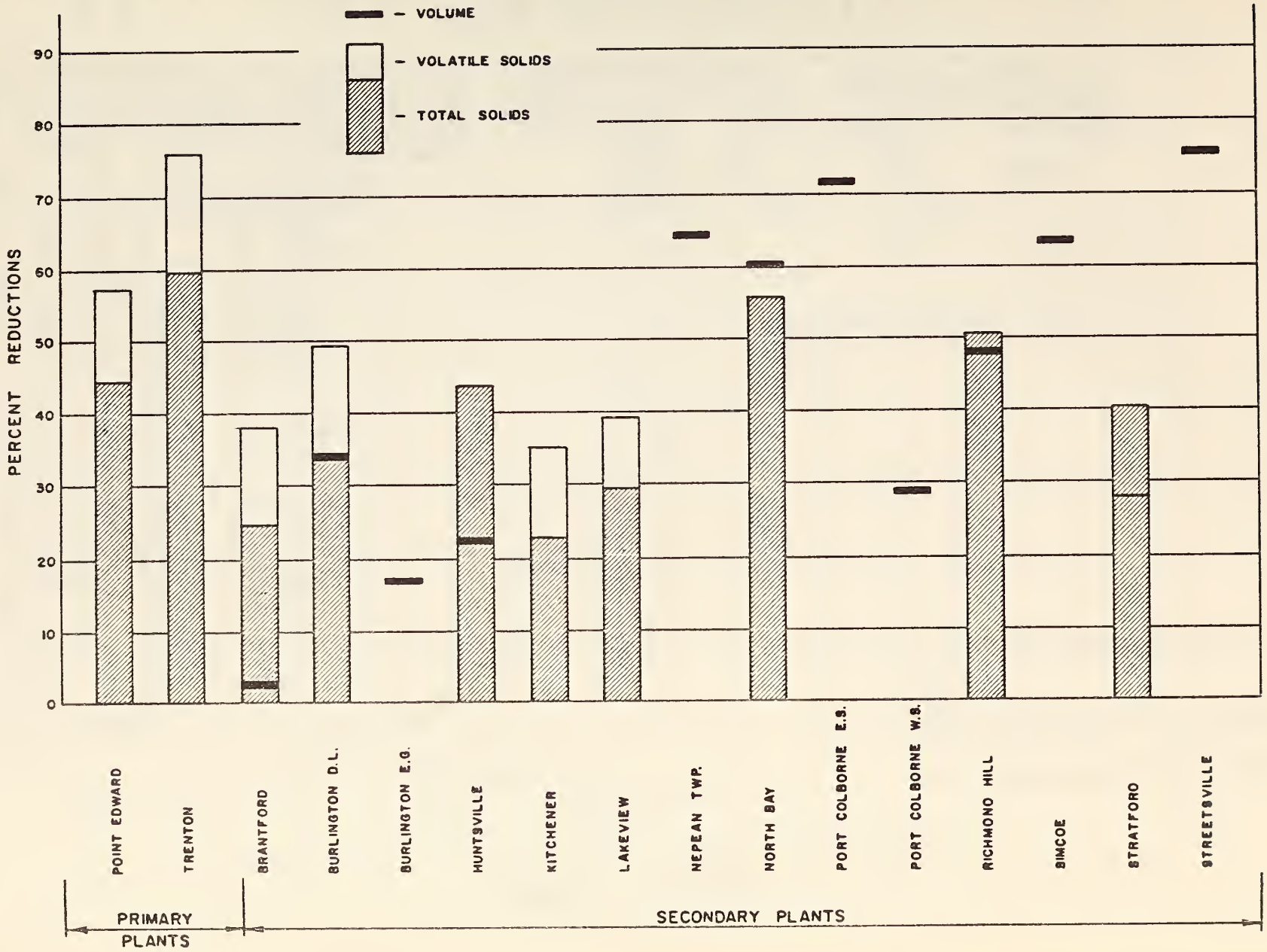
AS-ACTIVATED SLUDGE ID-SINGLE STAGE DIGESTION P-PRIMARY PLANT 2D-TWO STAGE DIGESTION---A-UNRELIABLE DATA B-LIMITED DATA C-NO DATA D-PROBABLY POOR QUALITY SUPERNATANT
E-LIMITED DATA DUE TO DIGESTER CLEAN OUT F-SUSPECT SLUDGE METERING IN ERROR

1. BELLEVILLE
2. ESPANOLA
3. PORT ERIE
4. PORT WILLIAM
5. OWEN SOUND
6. POINT EDWARD
7. PORT ARTHUR
8. SAULT STE MARIE
9. TRENTON
10. BRAMPTON
11. BRANTFORD
12. BURLINGTON DL
13. BURLINGTON EG
14. BURLINGTON SKYWAY
15. CONISTON
16. FERGUS
17. GALT
18. GEORGETOWN
19. HUNTSVILLE
20. KINGSTON TWP.
21. KITCHENER
22. LAKEVIEW
23. MARKHAM VILL.
24. MOORE TWP.
25. NEPEAN TWP.
26. NORTH BAY
27. ORANGEVILLE
28. PORT COLBORNE ES
29. PORT COLBORNE WS
30. PRESTON
31. RICHMOND HILL
32. SIDNEY TWP.
33. SIMCOE
34. STRATFORD
35. STREETSVILLE
36. TILLSONBURG
37. WATERLOO
38. WESTMINISTER

DIGESTER OPERATION

REDUCTIONS (%) OF TOTAL SOLIDS, VOLATILE SOLIDS AND VOLUME

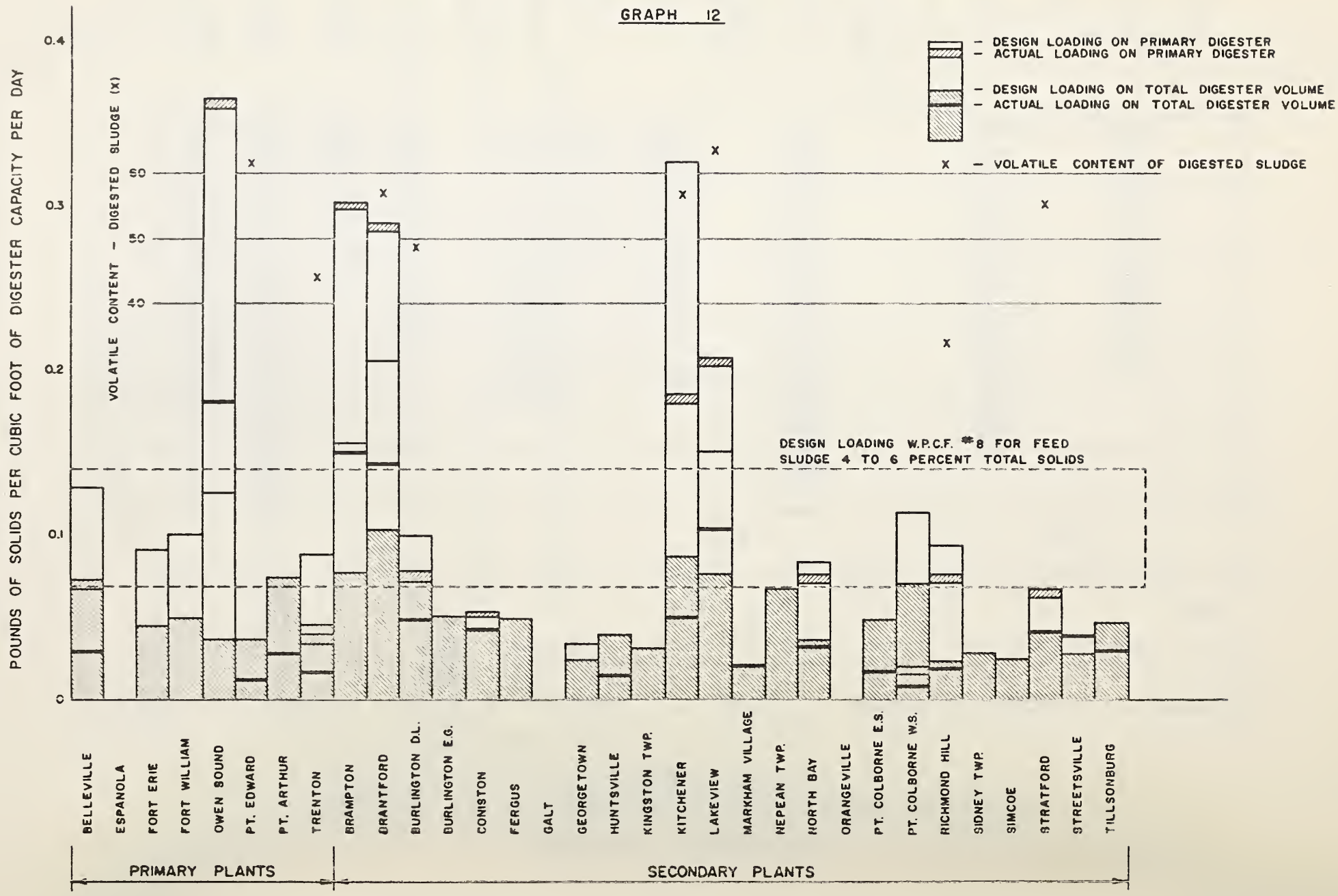
GRAPH II



DIGESTER LOADINGS

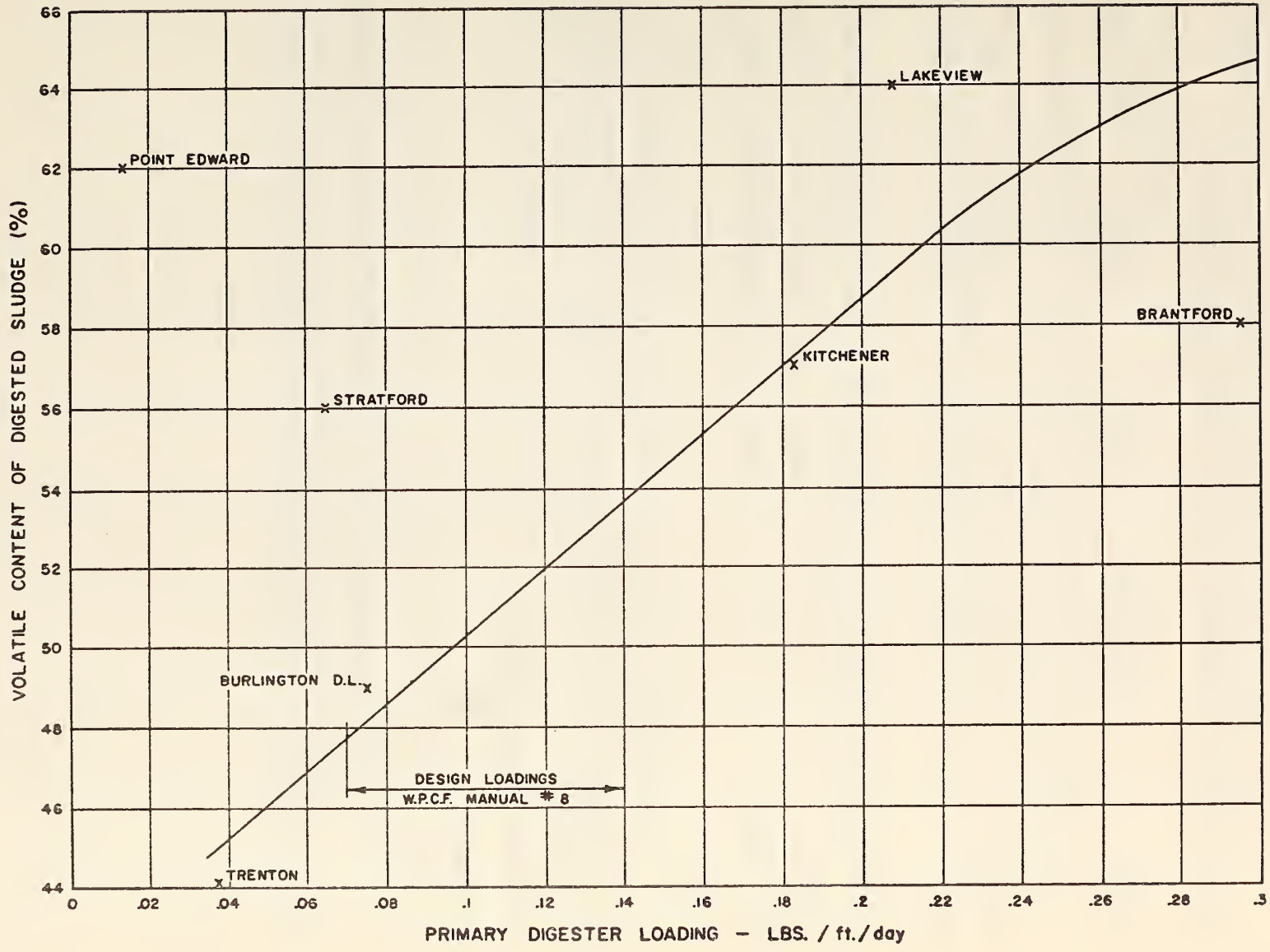
POUNDS OF SOLIDS PER CUBIC FOOT OF DIGESTER CAPACITY PER DAY

GRAPH 12



GRAPH 13

VOLATILE CONTENT OF DIGESTED SLUDGE VS. PRIMARY DIGESTER LOADING



VACUUM FILTRATION

During 1964, the OWRC operated 8 filters at 6 of its plants. The types of sludge filtered at these installation was varied as shown in the table below:

Project	Design Flow MGD	No. of Filters	Type of Sludge	Filter Area Sq. Ft.	Filter Media
Brantford	12.5	2	P-A-D	700	Coil Springs
Galt	5.0	1	P-A-D	380	Plastic Cloth Media
Kitchener	13.5	2	P-A-D	500	Coil Springs
Preston	1.8	1	P-A-R	250	Coil Springs
S. S. Marie	8.0	2	P-R	400	Coil Springs
Waterloo	4.0	1	P-A-R	300	Coil Springs

P - Primary

A - Waste Activated sludge

D - Digested

R - Raw

All of the stainless steel coil spring filters were manufactured by Komline-Sanderson Limited. The filter at Galt is fitted with various plastic cloth media.

CHEMICAL DOSAGES

Graph No. 14 indicates the dosages of lime and ferric chloride as percent by weight of dry solids filtered.

PRESTON

The chemical dosages at Preston show a wider, but generally lower range than values given in the FSIWA Manual #8. The yearly average of both lime and ferric chloride are quite low and is indicative of the excellent filter results.

WATERLOO

The chemical dosages at Waterloo show a wider range than values given in the FSIWA Manual #8. The average annual dosage of ferric chloride is close to the range, but the lime dosage is well above normally accepted values.

BRANTFORD

The chemical dosages at Brantford vary over a very small range indicating that the quality of the sludge is quite consistent. The average lime dosage was slightly over the range of values according to the FSIWA Manual #8.

GALT

The chemical dosages at Galt show the widest range of all the plants and the average annual values were well above the normally accepted values. Operation of the Galt vacuum filter as indicated by the chemical dosages was very difficult. Many different types of filter cloths were tried in an attempt to normalize the filtering process.

KITCHENER

The chemical dosages at Kitchener varied over a wide range and the average annual chemical dosages were extremely high.

The operation of the vacuum filters became extremely difficult when the change from primary digested to secondary digested was made.

SAULT STE. MARIE

Chemical dosages improved during the year for the Sault Ste. Marie filters. Although the dosages varied over a wider range than is normally expected the average annual dosages fell within acceptable values.

YIELDS

The filter yields at each of the plants are shown on Graph No. 15 . Each of the plants filtering undigested sludge obtained yields within the range given in the FSIWA Manual #8, with the exception of Preston which gave exceptionally good yields. The excellent yield from the Preston filter is undoubtably due to the heavy nature of the sewage solids which are quite high in starch.

The three plants filtering digested sludge all obtained yields much below the expected ranges in spite of having feed solids of normal consistency. An investigation into the reasons for these low filter yields will be initiated.

OPERATING COSTS

The total costs of the sludge filtering and disposal operations and the cost on a per ton basis are indicated in Table VIII .

The cost of filtering sludge varied from $5.00 per ton at Sault Ste. Marie to $20.54 per ton at Galt. Costs for labour, electricity and maintenance have been somewhat arbitrarily determined becuase of the difficulty of determining exact costs for all of the ancilliary equipment.

TABLE VII

OWRC WATER POLLUTION CONTROL PLANTS

VACUUM FILTRATION

1964

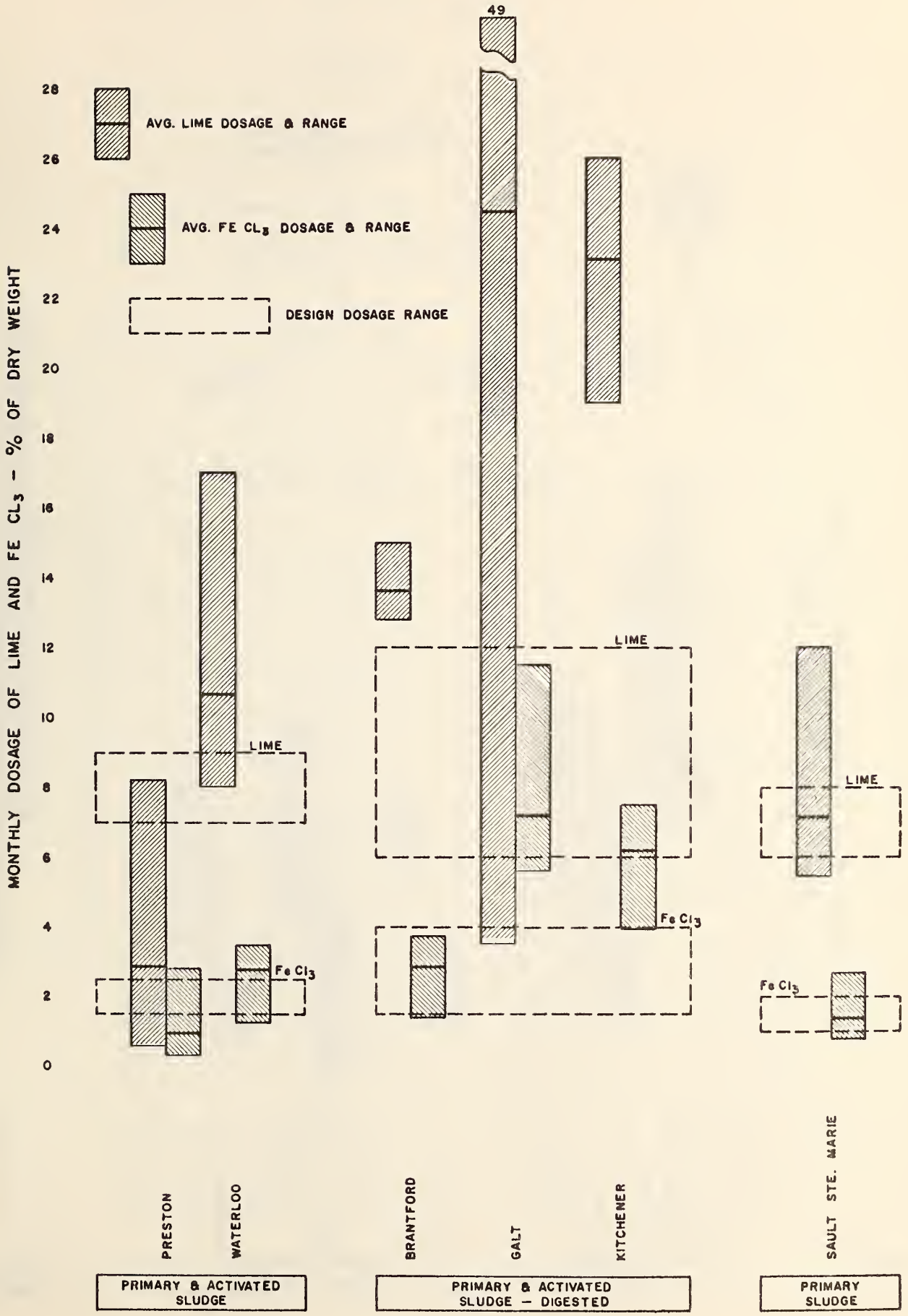
PROJECT	HRS. FILTERING/FILTER MONTHLY MAX / MIN	HRS. FILTERING/FILTER MONTHLY AV.	HRS. FILTERING/FILTER YEAR TOTAL	% SOLIDS IN FEED MONTHLY MAX / MIN	% SOLIDS IN FEED YEAR AV.	TONS OF SOLIDS MONTHLY MAX / MIN	TONS OF SOLIDS MONTHLY AV.	TONS OF SOLIDS YEAR TOTAL	TONS OF LIME MONTHLY MAX / MIN	TONS OF LIME MONTHLY AV.	TONS OF LIME YEAR TOTAL	% LIME MONTHLY MAX / MIN	% LIME YEAR AV.	TONS OF FE CL3 MONTHLY MAX / MIN	TONS OF FE CL3 MONTHLY AV.	TONS OF FE CL3 YEAR TOTAL	% FE CL3 MONTHLY MAX / MIN	% FE CL3 YEAR AV.	% SOLIDS CAKE MONTHLY MAX / MIN	% SOLIDS CAKE YEAR AV.	YIELD PSF/HR. MONTHLY MAX / MIN	YIELD PSF/HR. YEAR AV.
1 *	359.7 / 141.8	195.8	2350	5.57 / 4.62	5.16	239.90 / 155.90	205.11	2461.35	35.35 / 22.56	28.01	336.10	15.0 / 12.8	13.7	7.52 / 5.01	5.90	70.84	3.76 / 1.42	2.88	17.3 / 15.4	16.5	3.51 / 2.31	3.04
2 +	207.25 / 30.00	103.02	1133.25	6.66 / 3.80	4.92	126.95 / 11.42	57.00	626.97	21.88 / 3.18	13.65	150.15	49.0 / 3.6	24.4	7.42 / 0.70	3.81	41.94	11.50 / 5.68	7.15	41.2 / 23.0	26.7	3.86 / 1.56	2.60
3 **	417.0 / 104.5	323.1	2908.3	6.16 / 3.10	4.10	280.10 / 82.60	192.67	1734.05	61.13 / 15.60	44.80	403.24	26.1 / 18.9	23.1	18.32 / 3.30	12.06	108.58	7.50 / 3.99	6.15	22.5 / 11.7	17.8	3.21 / 2.04	2.44
4	80.0 / 38.0	51.4	617.2	9.20 / 5.00	6.80	53.68 / 26.04	44.06	528.74			▣ 12.68	▣ 8.2 / 0.6	▣ 2.4			▣▣ 5.20	2.40 / 0.27	▣▣ 0.98	32.2 / 22.0	27.1	9.9 / 5.0	7.0
5	154.0 / 70.5	89.8	1077.5	8.80 / 3.20	6.19	192.38 / 84.92	155.43	1865.16	17.00 / 7.82	11.01	132.10	12.0 / 5.4	7.1	3.79 / 1.39	2.13	25.60	2.76 / 0.80	1.37	27.2 / 22.6	25.2	12.60 / 5.35	9.43
6	330.5 / 201.5	275.8	3309.1	6.80 / 3.70	5.50	283.17 / 119.09	196.63	2359.54	25.42 / 14.38	21.01	252.12	17.1 / 8.0	10.7	6.01 / 3.16	4.74	56.91	3.53 / 1.22	2.41			5.80 / 2.10	4.50

PROJECTS
1 BRANTFORD * 2 FILTERS IN USE
2 GALT + BASED ON 11 MONTHS ACTUAL
3 KITCHENER ** BASED ON 9 MONTHS ACTUAL
4 PRESTON ▣ 6 MONTHS ACTUAL ▣▣ 11 MONTHS ACTUAL
5 SAULT STE. MARIE
6 WATERLOO

VACUUM FILTRATION

CHEMICAL DOSAGES - % DRY WEIGHT

GRAPH 14



TONS OF DRY SOLIDS FILTERED
1964
GRAPH 15

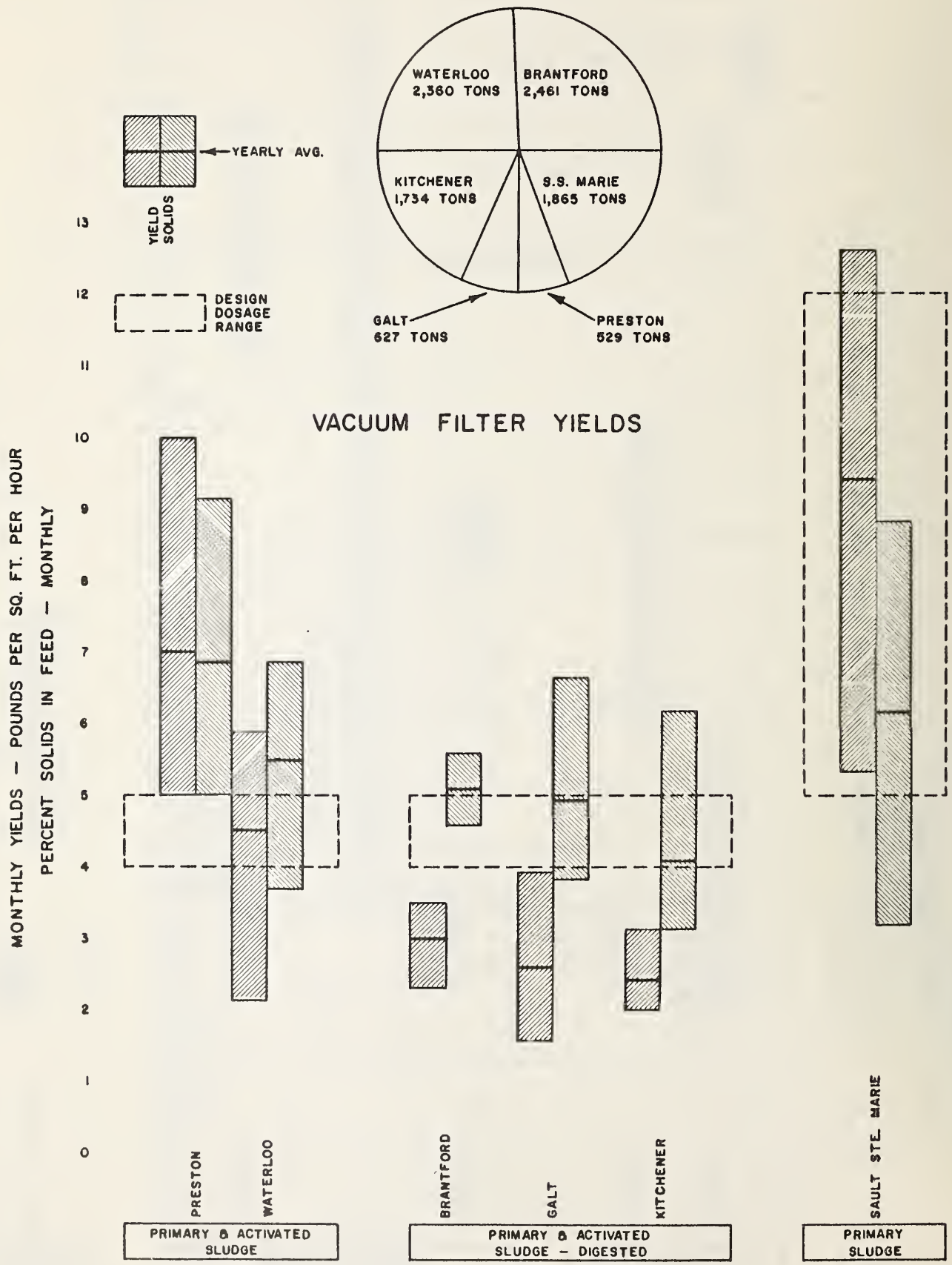


TABLE VIII

O W R C WATER POLLUTION CONTROL PLANTS

VACUUM FILTRATION

1964

T O T A L F I L T R A T I O N C O S T S

PROJECT	LABOR	ELECT	Fe Cl 3	LIME	MAINT	TOTAL	TONS/YR	DISPOSAL
BRANTFORD	4599.96	3446.00	9136.90	5915.33	1232.00	24330.19	2461	6500.00
GALT	3150.00	626.97	5470.85	2627.60	1000.00	12875.42	627	3079.60
KITCHENER	5778.00	1733.00	14142.00	7054.00	747.00	29454.00	1734	12400.00
PRESTON	2000.00	528.72	676.05	221.03	500.00	3925.80	529	1638.00
S. S. MARIE	4905.00	1865.16	4274.77	2311.74	746.00	14102.67	1865	9570.00
WATERLOO	7350.00	2360.00	7407.00	4410.00	1500.00	23027.00	2360	13802.42

C O S T P E R D R Y T O N F I L T E R E D

PROJECT	LABOR	ELEC	Fe Cl 3	LIME	MAINT	TOTAL	DISPOSAL
BRANTFORD	1.89	1.37	3.75	2.40	0.50	9.94	2.64
GALT	5.02	1.00	8.73	4.19	1.59	20.54	4.90
KITCHENER	3.33	1.00	8.16	4.07	0.43	16.99	7.15
PRESTON	3.78	1.00	1.28	0.42	0.95	7.42	3.10
S. S. MARIE	2.73	1.00	1.22	0.64	0.40	5.99	5.13
WATERLOO	3.12	1.00	3.14	1.87	0.64	9.76	5.85

OPERATING COSTS

The total costs of operating sewage treatment plants as used in this report are those involving the payroll of staff employed at the plants, fuel, power, chemicals, general supplies, equipment, repair and maintenance, sundry and water. The cost of head office supervision, including travel, accounting, purchasing and inspection is not included in the operating costs shown for each project.

An explanation of items included in each of the categories of the operating costs is as follows:

1. Payroll - Regular operators' salaries including pension and Workmen's Compensation payments.
   - Casual payroll - Salaries of labour employed on a temporary or part-time basis in time of staff shortage or for part-time work. Workmen's Compensation payments are also included.
2. Fuel - Includes fuel oil, natural gas, and/or propane used for heating.
3. Power - Includes hydro electric power and natural gas, gasoline, diesel oil if used for power generator.
4. Chemicals - Includes chlorine, ferric chloride, hydrated lime, pickle liquor, alum, sodium hypochloride, odour control chemicals, activated carbon, sodium chloride, pipe cleaning materials (where applicable).
5. General Supplies - Includes laboratory reagents, laboratory equipment replacement, cleaning materials, lubricants, stationery, uniforms, light bulbs, instrument charts, books.
6. Equipment - Includes equipment to be used in the treatment process, laboratory, building and grounds and small tools.

7. Maintenance - Includes goods and services (with the exception of OWRC staff) used in repairing and maintaining process, electrical and building equipment, inspections, packing, paint, etc.

8. Sundry - Includes express charges, telephone, telemetering, stamps, sludge haulage, etc.

9. Water - Includes all charges for water.

10. Travel - Includes operators' travel to local hardware stores, railroad station, conferences, conventions, etc. The cost of accommodation and meals associated with conferences and conventions is also included.

The major contributor to the cost of operation was payroll. On primary treatment plants the payroll costs averaged 42.1 percent of the total operating costs and ranged from a low of 32 percent at Trenton to a high of 57 percent at Fort William.

On secondary treatment plants the payroll costs averaged 45.2 percent of the total operating costs and ranged from a low of 25 percent at Lakeview to a high of 62 percent at Brantford.

POWER COSTS

The cost of power as a percent of total operating costs and on a per million gallon basis is shown on Tables XI and XII.

Power costs for primary treatment plants varied from 11 to 20 percent and averaged 15.4 percent. Power costs for secondary plants varied from 6 to 40 percent and averaged 17.2 percent.

Power costs per million gallons treated are shown on Graph No. 19 . The graph shows a very wide range due to differences in pumping, vacuum filtration and flows in the smaller plants, but stabilizes somewhat in the larger adequately loaded plants.

The Burlington Skyway plant shows an extremely high power cost because it is underloaded, has an inplant pumping station and is designed to operate now as a total oxidation plant, but eventually to change to a large conventional plant.

The Waterloo plant shows a high power consumption because of the extremely high BOD and SS loads and the continual operation of the vacuum filter.

MAINTENANCE COSTS

The cost of maintenance as a percent of total operating costs and on a per million gallon basis is shown on Tables XI and XII.

Maintenance costs for primary treatment plants varied from 4 to 23 percent and averaged 9.6 percent. Maintenance costs for secondary treatment plants varied from 6 to 22 percent and averaged 11.6 percent.

Maintenance costs per million gallons treated are shown on Graph 20. The graph shows a very wide range due to differences in flows, amount of equipment and age of the plant, but stabilizes somewhat in the larger adequately loaded plants.

The Burlington Skyway plant shows an extremely high maintenance cost because of the large amount of equipment and the low flows.

SLUDGE DISPOSAL

The cost of disposal as a percent of total operating costs and on a per million gallon basis is shown on Tables XI and XII.

Sludge disposal costs for primary treatment varied from 1 to 13 percent and averaged 5.2 percent of total operating costs. Sludge disposal costs for secondary treatment varied from 3 to 39 percent and average 12.8 percent.

Some plants showed nil sludge disposal costs for the following reasons:

1. Initial year of operation and no sludge to be disposed of.

2. Sludge drying beds or lagoons and removal by plant staff or public.

3. Removal at no cost by municipality.

The highest sludge hauling costs occurred at the Lakeview plant where the large volumes of sludge and the necessity to haul it long distances made the hauling costs extremely high. All plants with vacuum filters will show an artificially low disposal cost because sludge is thickened prior to disposal.

TABLE IX

OWRC WATER POLLUTION CONTROL PLANTS

OPERATING COSTS

1964

SECONDARY TREATMENT

PROJECT	TOTAL	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICAL	GENERAL SUPPLIES	EQUIP	REPAIRS & MAINT.	SUNDRY	WATER	TRAVEL
BRAMPTON	41,489.00	11,564.01	4701.95	122.32	5718.08	3310.16	928.06	5231.61	1479.45	6950.58	1141.79	341.00
BRANTFORD	171,859.76	104,430.57	2715.03	954.25	23489.09	18533.45	3893.22	707.85	4540.79	8962.89	2980.84	651.78
BURLINGTON D.L.	45,025.90	23,211.79		60.61	7469.04	4314.06	876.35	1060.67	1383.35	6160.82	289.66	199.55
BURLINGTON E.G.	21,957.56	10,355.83		982.74	3724.38	272.22	706.22	430.48	1385.44	3353.97	599.28	147.00
BURLINGTON SKY.	43,402.99	14,318.02			17391.76	1340.20	1589.70	3070.47	851.43	4124.12	361.74	345.55
CONISTON	11,738.97	4,733.05	1071.50	729.31	1114.89	324.24	369.55	1369.36	748.17	321.00		717.30
FERGUS	19,881.89	8,623.87		371.96	1184.72	1135.41	747.23	1218.33	1582.22	4196.49	552.96	168.70
GALT	77,875.88	32,720.37	1718.22	2550.84	7689.72	18911.10	1792.47	961.13	3433.01	6707.82	1263.00	128.20
GEORGETOWN	29,738.15	13,133.49	515.51	1121.51	3484.72	923.02	1484.43	1498.43	2077.57	4998.56		492.15
HUNTSVILLE	10,121.07	4,016.47	312.14	411.53	1263.54	240.02	485.51	179.88	546.84	2165.00	387.61	112.53
KINGSTON TWP.	23,296.77	9,086.55	300.43	1452.22	6460.77	601.60	1004.24	1145.83	400.65	2195.10		649.40
KITCHENER	217,424.52	81,465.05	6798.20		34042.25	31838.33	3960.06	3803.72	16594.97	38011.10	352.35	558.49
LAKEVIEW	159,677.53	32,457.67	8755.48	516.40	19312.41	9340.36	3372.61	3286.84	3443.40	78368.06	703.65	120.65
MARKHAM VILL.	15,120.53	8,984.45		779.91	1946.07	63.06	617.99	687.49	536.46	793.61	582.59	128.90
MOORE TWP.	10,546.67	4,569.61	232.20		3581.00	311.79	507.06	550.41	444.70	187.43	142.47	20.00
NEPEAN TWP.	31,159.12	11,648.16	1209.96	332.07	8027.41	889.15	909.21	501.50	4951.17	1470.39		1220.10
NORTH BAY	72,953.91	30,506.95	1719.78	76.77	10024.18	1564.32	2815.02	673.97	5031.25	16869.55	3199.99	472.13
ORANGEVILLE	13,000.89	4,532.77		195.61	1441.08	1705.38	216.60	145.44	456.81	4307.20		
PORT COLBORNE E.S. *	57,818.45	38,627.06	207.24	1502.35	3916.57	67.17	2810.00	180.36	1021.11	3420.76	373.38	*692.45
PORT COLBORNE W.S.												
PRESTON	30,646.67	13,617.59	474.34	533.71	4917.83	1620.07	1109.62	842.73	1261.44	3420.63	2667.07	184.64
RICHMOND HILL	51,048.81	16,518.15	3994.37	1142.04	6569.64	5463.97	1011.62	185.95	2056.21	13697.06		399.80
SIDNEY TWP.	6,024.26	2,007.24	746.28	598.09	1098.31	317.56	273.15	141.93	22.48	287.22		532.00
SIMCOE	33,517.36	15,213.49	2742.56	1190.77	7731.81	814.98	1459.19	2214.44	1228.04	361.72	385.46	174.90
STRATFORD	53,649.88	26,699.97	2580.35	69.35	5901.60	95.38	2466.36	595.35	4197.95	10173.17	625.74	245.65
STREETSVILLE	14,024.94	4,110.24	2825.73	787.83	1475.77	441.01	487.36	80.63	937.01	2651.75	227.61	
TILLSONBURG	21,844.08	8,614.38		134.13	5157.89	168.04	880.04	505.95	1481.69	4547.06	229.90	125.00
WATERLOO	112,363.46	35,052.75	2951.37	1735.83	22579.02	21051.80	1914.29	2216.93	4821.16	19479.16		561.15
WESTMINSTER	10,784.36	4,480.26	633.83		2602.78	213.22	316.42	49.99	981.74	1262.81		243.90

PRIMARY TREATMENT

* COMBINED COST

BELLEVILLE	41,246.10	13,690.11	-	1100.59	7,422.65	730.54	1351.51	120.01	1217.71	13859.63	1162.75	590.60
ESPANOLA	7,109.88	2,556.22	44.10	838.18	1,418.09	(93.97)	244.59	78.38	2.52	1393.45	-	628.32
FORT ERIE	23,886.73	9,822.35	253.26	1566.94	4,650.16	1616.84	1198.55	651.86	158.10	3678.76	-	289.89
FORT WILLIAM	30,424.60	16,321.27	768.40	1952.50	5,344.30	3359.92	1384.55	665.50	108.80	391.04	81.00	47.32
OWEN SOUND	27,331.80	11,177.96	1721.61	1339.63	4,905.91	119.81	772.47	755.88	1028.28	3725.93	1492.07	292.25
POINT EDWARD	12,451.09	5,103.63	-	1404.51	885.66	153.42	296.53	550.05	419.10	1917.86	1543.67	176.66
PORT ARTHUR	45,374.87	15,560.48	5023.02	1216.94	5,289.56	3319.95	1220.20	369.36	2526.80	8205.96	2281.88	360.72
S.S. MARIE	112,623.50	49,515.17	984.40	2545.20	16,555.53	11831.19	2472.50	1251.40	5046.98	19907.11	2249.42	264.60
TRENTON	18,422.16	5,083.11	650.88	464.34	2,413.87	2352.20	705.45	105.00	3761.86	1476.36	1139.29	269.80

TABLE X

OPERATING COSTS

1964

SECONDARY PLANTS

PROJECT	TYPE	DESIGN CAPACITY	OPERATING COSTS	COST / M.G. $	COST / LB. B.O.D. REM'D $	COST / LB S.S. REM'D $
BRAMPTON	A S	2.000	41,489.00	51.10	0.01	0.06
BRANTFORD	A S	12.500	171,859.76	77.39	0.06	0.05
BURLINGTON D. L.	A S	2.500	45,025.90	54.65	0.02	0.02
BURLINGTON E. G.	A S	0.750	21,957.56	93.24	0.06	0.05
BURLINGTON SKY.	T O	3.125	43,402.99	160.15	0.08	0.07
CONISTON	A S	0.260	11,738.97	178.28	0.09	0.10
FERGUS	A S	0.600	19,881.89	110.37	0.04	0.04
GALT	A S	5.000	77,875.88	41.09	0.03	0.03
GEORGETOWN	A S	1.500	29,738.15	96.82	0.10	0.06
HUNTSVILLE	A S	0.250	10,121.07	159.75	0.12	0.09
KINGSTON TWP	A S	0.83	23,296.77	214.34	0.43	0.21
KITCHENER	A S	13.500	217,424.52	71.84	0.02	0.02
LAKEVIEW	A S	5.000	159,677.53	87.69	0.03	0.03
MARKHAM VILLAGE	A S	0.334	15,120.53	179.62	0.07	0.05
MOORE TWP.	T O	0.320	10,546.67	329.38	0.17	0.18
NEPEAN TWP.	A S	1.500	31,159.12	42.89	0.07	0.08
NORTH BAY	A S	4.000	72,953.91	59.10	0.04	0.02
ORANGEVILLE	A S	0.750	13,000.89	69.38	0.08	0.06
PORT COLBORNE E.S.	A S	0.850	(57,818.45)	(135.88)	(0.17)	(0.13)
PORT COLBORNE W.S.	A S	0.900				
PRESTON	A S	1.800	30,646.67	107.80	0.02	0.02
RICHMOND HILL	A S	1.600	51,048.81	108.10	0.06	0.04
SIDNEY TWP.	A S	0.125	6,024.26	63.02	0.10	0.05
SIMCOE	A S	2.000	33,517.36	69.06	0.02	0.03
STRATFORD	A S	4.000	53,649.88	53.95	0.03	0.02
STREETSVILLE	A S	0.800	14,024.94	81.39	0.03	0.02
TILLSONBURG	A S	0.665	21,844.08	116.50	0.06	0.05
WATERLOO	A S	4.000	112,363.46	131.74	0.02	0.03
WESTMINSTER	T O	0.250	10,784.36	205.54	0.16	0.09
AVERAGE				111.79	0.08	0.06

PRIMARY PLANTS

PROJECT	DESIGN CAPACITY MG	OPERATING COSTS	COST/ M.G. $	COST/ LB. B.O.D. REM'D $	COST / LB S.S. REM'D $
BELLEVILLE	3.0	41,246.10	22.00	0.025	0.010
ESPANOLA	0.665	7,109.88	129.51	0.235	0.059
FORT ERIE	1.8	23,886.73	46.57	0.180	0.111
FORT WILLIAM	6.0	30,424.60	37.11	-	-
OWEN SOUND	3.0	27,331.80	23.82	0.030	0.020
POINT EDWARD	0.57	12,451.09	186.88	0.230	0.082
PORT ARTHUR	4.0	45,374.87	27.52	0.040	0.025
SAULT STE. MARIE	8.0	112,623.50	46.29	0.120	0.046
TRENTON	1.0	18,422.16	99.98	0.125	0.800
AVERAGE			68.85	0.123	0.144

TABLE XI

O W R C WATER POLLUTION CONTROL PLANTS

PRIMARY TREATMENT

OPERATING COSTS

1964

PROJECT	TOTAL OPERATING COSTS	LABOR COSTS			POWER COSTS			MAINTENANCE			SLUDGE DISPOSAL		
		TOTAL	% OF TOTAL	$ PER M.G.	TOTAL	% OF TOTAL	$ PER M.G.	TOTAL	% OF TOTAL	$ PER M.G.	TOTAL	% OF TOTAL	$ PER M.G.
BELLEVILLE	41,246.10	13,690.11	33.2	7.28	7422.65	18.0	3.95	2689.23	6.5	1.43	520.38	1.0	0.28
ESPANOLA *	7,109.88	2,600.32	36.0	15.79	1418.09	20.0	8.61	325.49	4.0	1.98	592.80	8.0	3.60
FORT ERIE	23,886.73	10,075.63	42.0	19.64	4650.16	19.0	9.07	2008.51	9.0	3.92	314.08	1.0	0.61
FORT WILLIAM	30,424.60	17,089.67	57.0	20.85	5344.30	17.0	6.52	2158.85	7.5	2.63	NIL		
OWEN SOUND	27,331.80	12,889.57	47.2	11.24	4905.91	17.9	4.28	2556.53	9.4	2.23	731.11	2.7	0.64
POINT EDWARD	12,451.09	5,103.63	41.0	76.60	885.66	7.1	13.29	1265.68	10.2	19.00	280.80	2.0	4.21
PORT ARTHUR	45,374.87	20,583.50	45.5	12.48	5289.56	11.5	3.21	4116.36	9.0	2.50	5836.60	12.9	3.54
S.S. MARIE	112,623.50	50,499.57	45.0	20.76	16555.53	15.0	6.81	8770.88	8.0	3.61	9750.00	8.5	3.90
TRENTON	18,422.16	5,733.99	32.0	31.12	2413.87	13.0	13.10	4572.31	23.0	24.82	NIL		
AVERAGE			42.1			15.4			9.6			5.2	

* BASED ON ESTIMATED FLOW

LABOUR INCLUDES: PERMANENT & CASUAL

MAINTENANCE INCLUDES: GENERAL SUPPLIES , MINOR EQUIPMENT, REPAIRS & MAINTENANCE

TABLE XII

OPERATING COSTS

1964

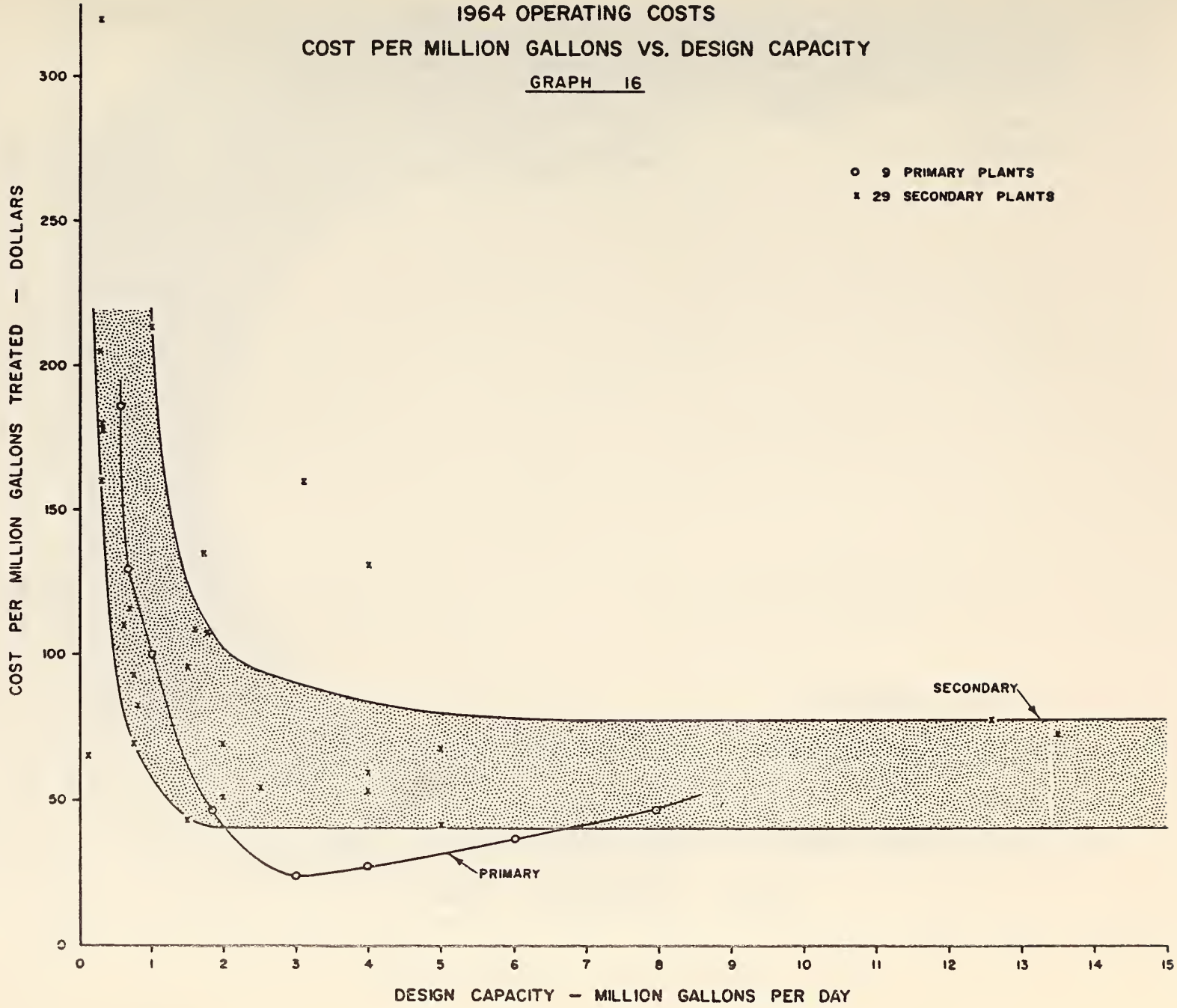
SECONDARY PLANTS

PROJECT	TOTAL OPERATING COSTS	LABOR COSTS			POWER COSTS			MAINTENANCE			SLUDGE DISPOSAL			
		TOTAL	% OF TOTAL	$ PER M.G.	TOTAL	% OF TOTAL	$ PER M.G.	TOTAL	% OF TOTAL	$ PER M.G.	TOTAL	% OF TOTAL	$ PER M.G.	
BRAMPTON	41,489.00	16,256.95	39.0	20.06	5718.08	14.0	7.06	7639.12	18.0	9.43	2545.20	6.1	3.15	
BRANTFORD	171,859.76	107,145.60	62.4	48.24	23489.09	13.7	10.58	9087.86	5.3	4.09	4980.32	2.9	2.24	
BURLINGTON D.L.	45,025.90	23,211.79	51.4	28.18	7469.04	17.0	9.07	3320.37	6.9	4.03	3419.20	7.6	4.15	
BURLINGTON E.G.	21,957.56	10,355.83	48.0	43.98	3724.38	17.0	15.82	2522.14	11.0	10.71	2069.94	9.5	8.80	
BURLINGTON SKY.	43,402.99	14,318.02	33.0	52.83	17391.76	40.0	64.17	5521.60	13.0	20.37	NIL			X
CONISTON	11,738.97	5,844.55	50.0	88.76	1114.89	10.0	16.93	2687.68	22.0	40.82	NIL			+
FERGUS	19,381.89	8,623.87	43.0	47.88	1184.72	6.0	6.58	3647.78	18.5	20.25	NIL			
GALT	77,875.88	34,438.59	44.0	18.17	7689.72	10.0	4.06	6186.61	8.0	3.26	2693.40	3.5	1.42	
GEORGETOWN	29,738.15	13,649.00	46.0	43.86	3484.72	12.0	11.35	5061.18	18.0	16.48	3675.60	12.4	11.97	
HUNTSVILLE	10,121.07	4,328.61	43.0	68.44	1263.54	12.0	19.98	1212.23	12.0	19.17	1308.66	12.9	20.69	
KINGSTON TWP.	23,296.77	9,386.98	40.0	84.09	6460.77	28.0	57.88	2550.70	11.0	22.85	NIL			
KITCHENER	217,424.52	88,263.25	39.0	29.16	34042.25	16.0	11.25	24358.75	12.0	8.05	12400.00	5.7	4.10	
LAKEVIEW	159,577.53	41,213.15	25.5	17.47	18312.41	12.0	8.19	10102.85	6.0	4.28	62,461.68	39.1	26.48	
MARKHAM VILL.	15,120.53	8,984.45	59.5	106.73	1946.07	13.0	23.12	1841.94	12.0	21.88	NIL			
MOORE TWP.	10,546.67	4,801.81	45.3	149.96	3581.00	34.0	111.84	1502.17	14.0	46.91	NIL			+
NEPEAN TWP.	31,159.12	12,858.12	41.3	17.70	8027.41	25.8	11.05	6361.88	20.4	8.76	NIL			
NORTH BAY	72,953.91	32,226.73	44.4	26.11	10024.18	13.5	8.12	8520.24	12.0	6.90	13435.66	18.4	10.88	
ORANGEVILLE	13,000.89	4,532.77	34.9	24.19	1441.03	11.1	7.69	818.85	6.3	4.37	3277.06	25.2	17.49	
PORT COLBORNE E.S.	57,818.45	38,834.30	67.5	91.26	8916.57	15.0	20.95	4011.47	7.5	9.43	1863.50	3.2	4.38	
PORT COLBORNE W.S.	*													*
PRESTON	30,646.67	14,091.93	45.5	49.56	4917.83	16.0	17.30	3212.79	10.5	11.30	1638.00	5.3	5.75	
RICHMOND HILL	51,048.81	20,512.52	40.2	43.44	6569.64	12.9	13.91	3263.78	6.4	6.91	13467.00	26.4	28.52	
SIDNEY TWP.	6,024.26	2,753.52	45.0	28.81	1098.31	19.0	11.49	437.56	7.5	4.58	NIL			+
SIMCOE	33,517.36	17,956.05	53.0	37.00	7731.81	23.0	15.93	4901.67	15.0	10.10	NIL			
STRATFORD	53,649.88	29,280.32	54.6	29.45	5901.60	11.0	5.94	7258.67	13.5	7.30	7539.00	14.1	7.58	
STREETSVILLE	14,024.94	6,935.97	49.0	40.26	1475.77	11.0	8.57	1505.00	10.5	8.73	2331.25	16.6	13.53	
TILLSONBURG	21,844.08	8,614.38	39.4	45.95	5157.89	23.6	27.51	2867.68	13.1	15.30	4341.82	19.9	23.16	
WATERLOO	112,363.46	38,004.12	34.0	44.56	22579.02	20.0	26.47	8952.38	8.0	10.50	13715.66	12.2	16.08	
WESTMINSTER	10,784.36	5,113.50	46.5	97.46	2602.78	24.0	49.61	1348.15	12.5	25.69	471.75	4.4	8.99	
AVERAGE			45.16			17.2			11.6			12.8		

X COSTS BASED ON 4 MONTH'S FLOW

\+ COSTS BASED ON PRO-RATED FLOWS

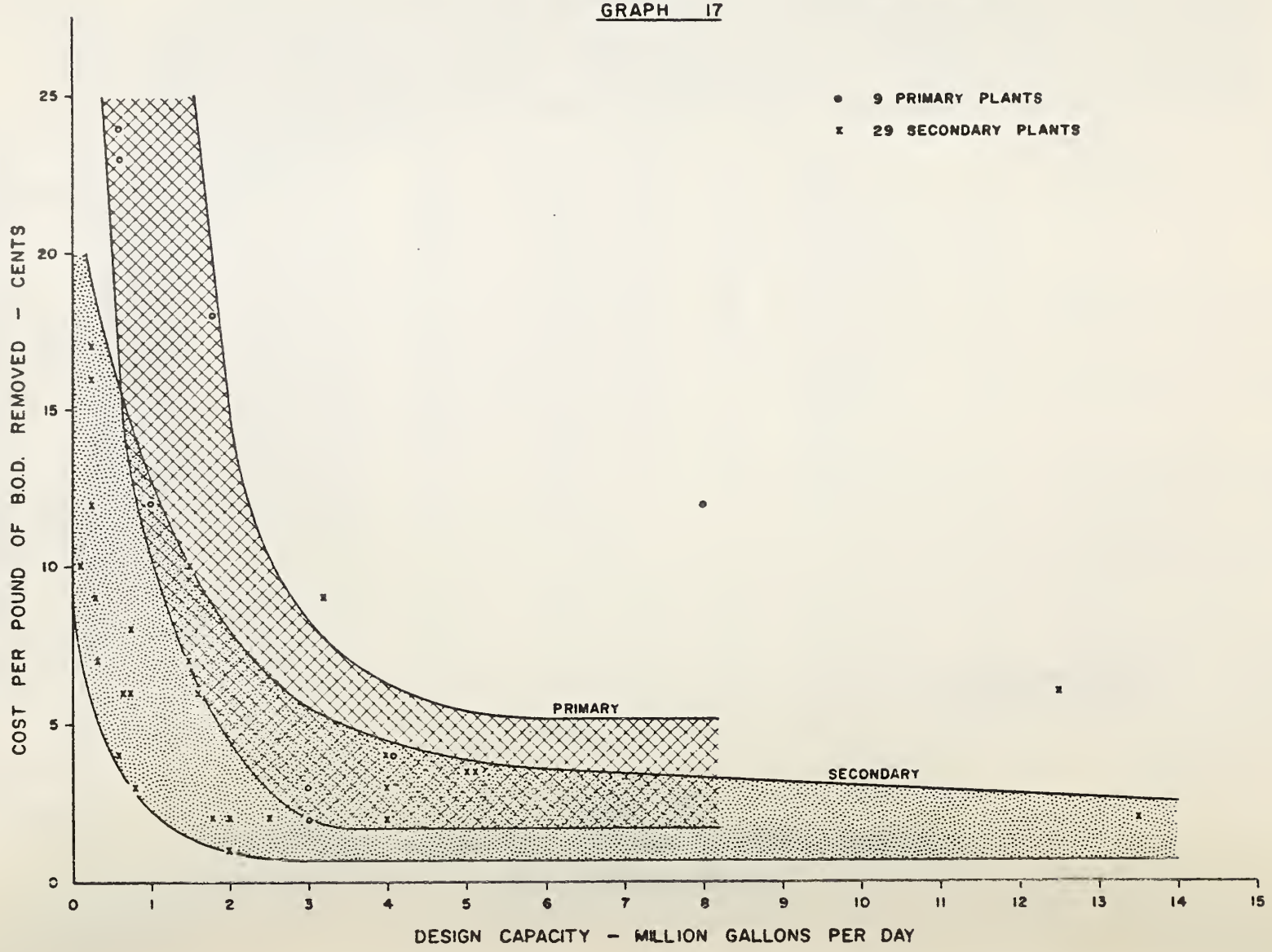
* COMBINED COSTS.


1964 OPERATING COSTS
COST PER MILLION GALLONS VS. DESIGN CAPACITY
GRAPH 16
o 9 PRIMARY PLANTS
x 29 SECONDARY PLANTS
COST PER MILLION GALLONS TREATED — DOLLARS
300
250
200
150
100
50
0
SECONDARY
PRIMARY
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
DESIGN CAPACITY — MILLION GALLONS PER DAY

1964 OPERATING COSTS

COST PER POUND OF B.O.D. REMOVED VS DESIGN FLOW

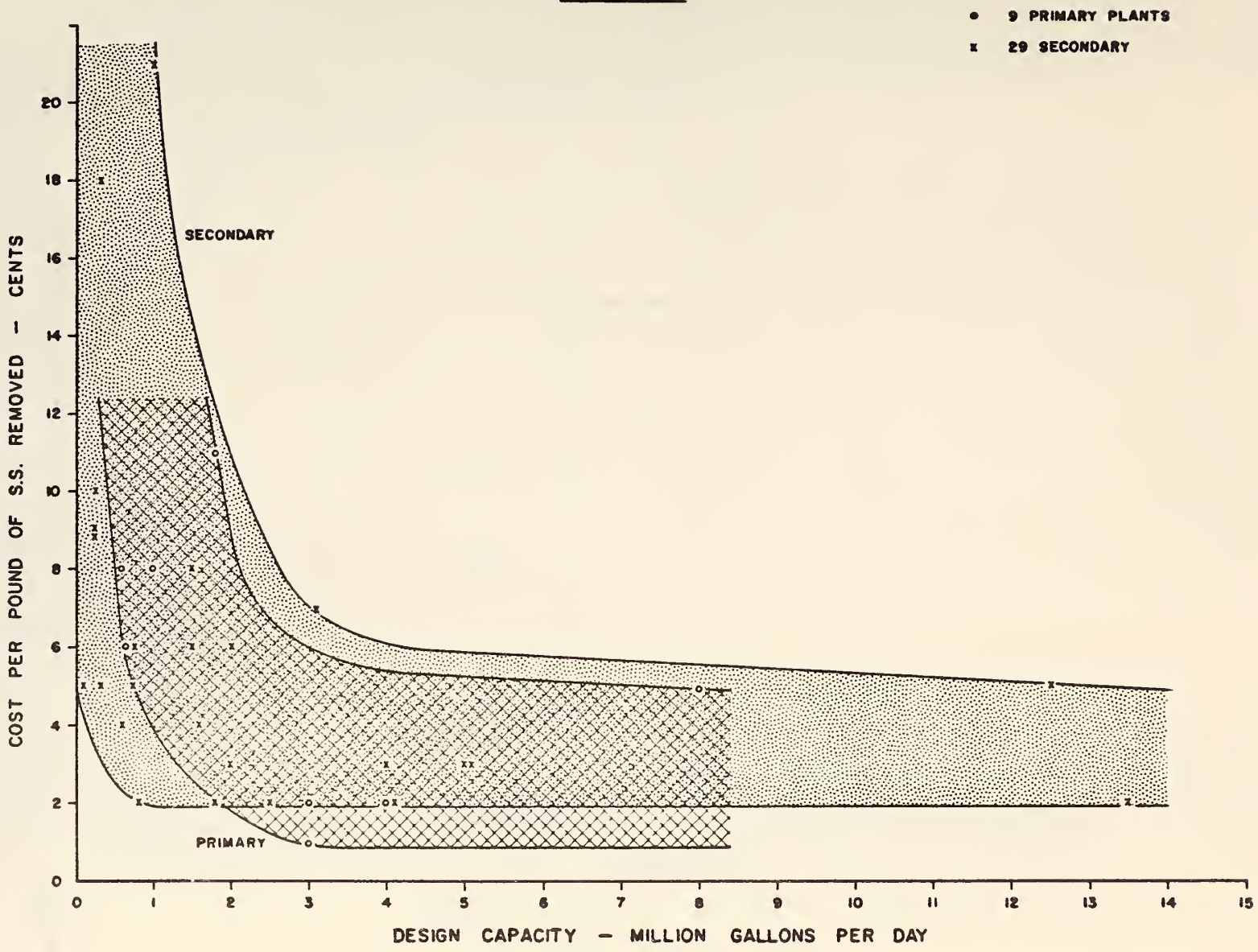
GRAPH 17



1964 OPERATING COSTS

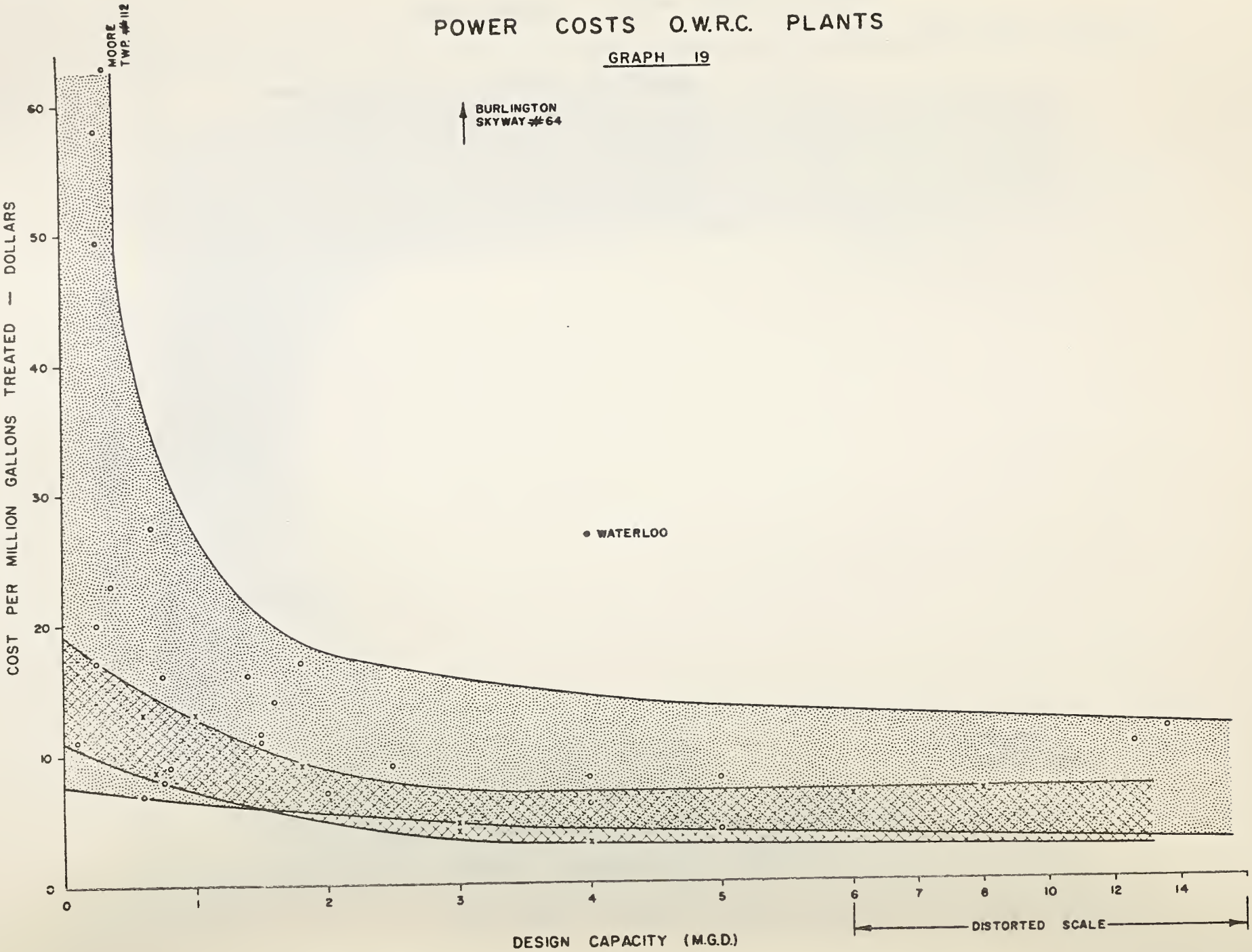
COST PER POUND OF S.S. REMOVED VS. DESIGN FLOW

GRAPH 18



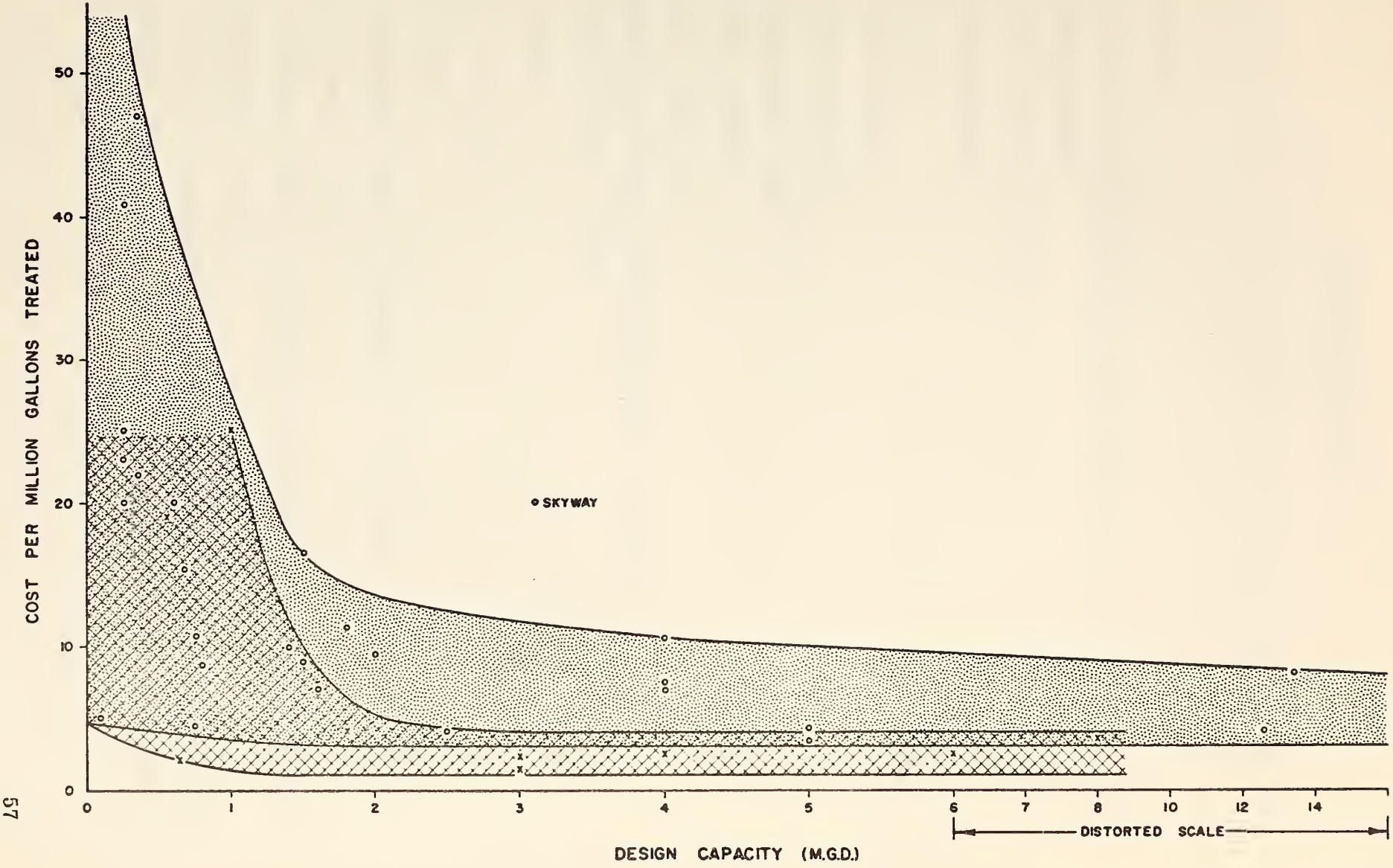
POWER COSTS O.W.R.C. PLANTS

GRAPH 19



MAINTENANCE COSTS O.W.R.C. PLANTS

GRAPH 20



OPERATING STAFF

During 1964, the Commission's 9 primary plants and 29 secondary treatment plants were operated by a total of 165.5 permanent employees and the equivalent of 7.5 casual employees.

There were 13 different classifications in effect as follows:

8	Superintendents
1	Assistant Superintendent
18	Chief Operators
6	Foreman
9	Plant Mechanics
3	Plant Electricians
2	Laboratory Technicians
2	Filter Operator
7	Senior Operators
94	Operators (Trenton & Sidney Twp. share 1 operator)
7	Groundskeeper - Janitors
1	Clerk
7.5	Casual laborers
165.5	TOTAL

Seven of the 38 plants were staffed with only one man. The largest staff was 22.5 men at the Brantford plant.

As indicated in Graph 21 most of the primary plants were staffed by about 1 man per million gallons of capacity.

The very small secondary plants, generally about a third of a million capacity, have one operator . Depending on local circumstances plants in the size range from 0.3 to 1 mgd are staffed with 2 operators.

The larger plants above a capacity of 1 mgd are staffed with between 2.5 and 1.5 men per MGD treatment capacity.

The Markham Village plant shows the highest staff complement on a men per mgd basis, because there are two operators and the plant only has a capacity of 0.334 mgd. There are 2 pumping manholes and 1 large on site pumping station associated with this project.

The Richmond Hill and Simcoe projects show a generally higher staff complement because the Richmond Hill project consists of 3 plants side by side and the Simcoe project 2 plants side by side.

TABLE XIII

OPERATING STAFF

PRIMARY TREATMENT PLANTS

1964

PROJECT	TYPE	CLASSIFICATION: SUPERINTENDENT	ASST. SUPER	CHIEF OPERATOR	FOREMAN	PLANT MECHANIC	PLANT ELECT.	LAB. TECH.	FILTER OP.	SENIOR OP.	OPERATOR	GROUNDS-JANIT.	CLERK	CASUAL	TOTAL	DESIGN CAPACITY M.G.D.	AVG. DAILY FLOW M.G.D.	MEN PER M.G.D. DESIGN	HOURS PER WEEK COVERAGE
BELLEVILLE	PP,DT			1							2				3	3.00	5.14	1.0	48
ESPANOLA	DT										1				1				
FORT ERIE	PP			1							1				2	1.80	1.05	0.9	44
FORT WILLIAM	PP,DT			1		1					3	1			6	6.00	2.24	1.0	112
OWEN SOUND	PP			1							2				3	3.00	3.13	1.0	48
POINT EDWARD	PP,DT										1				1	0.57	0.18	1.7	40
PORT ARTHUR	PP,DT			1							2			1	4	4.00	4.51	1.0	112
S. S. MARIE	VT	1				1			1		6	1			10	8.00	6.65	1.2	112
TRENTON	DT			1							.5				1.5	1.00	0.50	1.5	44
TOTAL		1	0	6	0	2	0	0	1	0	18.5	2	0	1	31.5				

P - PUMPING AT PLANT
PP - PUMPING IN SYSTEM & PLANT
D - DIGESTION
DB - DIGESTION & SAND DRYING BEDS
DT - DIGESTION & LIQUID TRUCKING
VT - VACUUM FILTRATION & TRUCKING

TABLE XIV

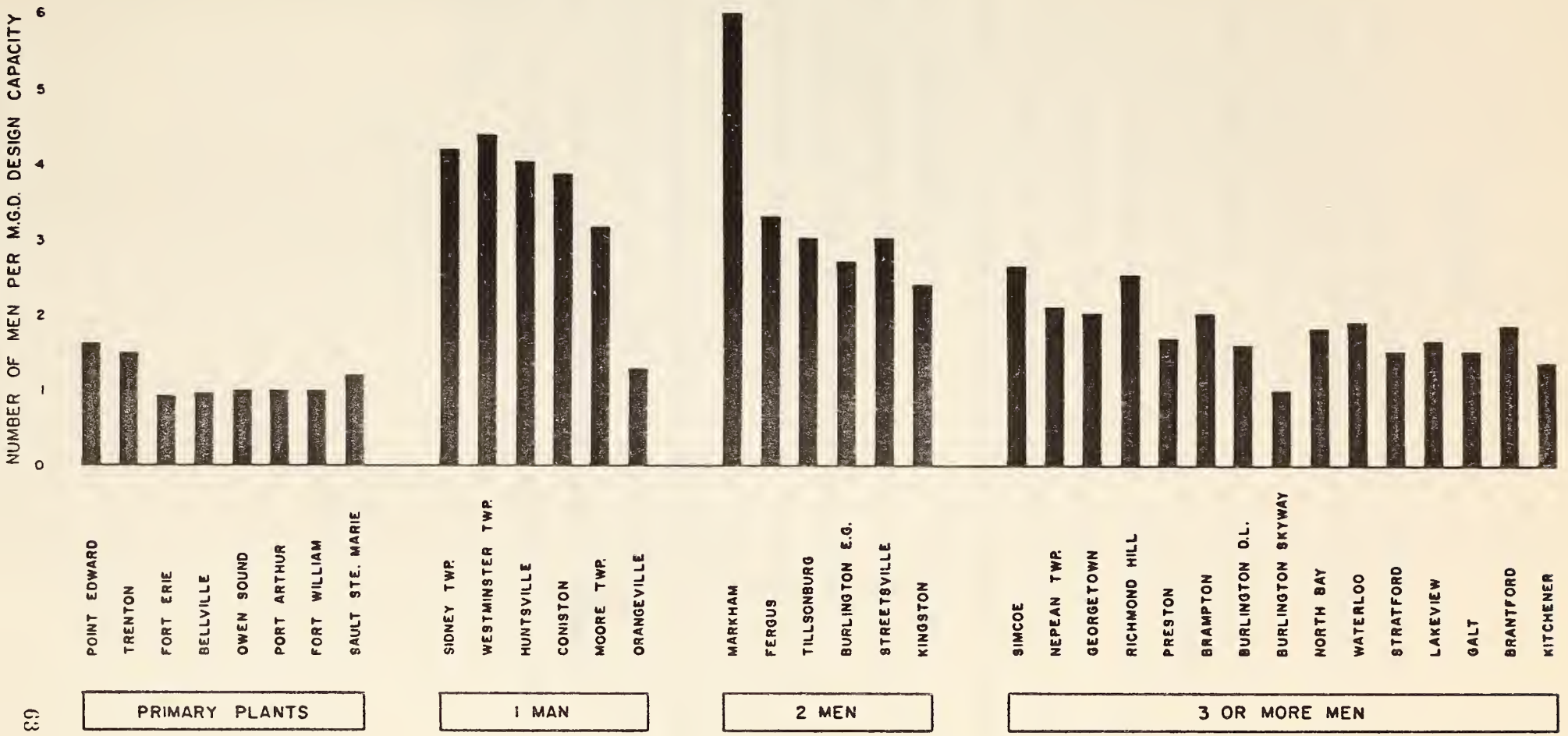
OPERATING STAFF

SECONDARY TREATMENT PLANTS

1964

PROJECT	CLASSIFICATION													TOTAL	DESIGN CAPACITY	AVG. DAILY FLOW	MEN PER M.G.D. DESIGN	HOURS PER WEEK COVERAGE
	SUPERINTENDENT	ASST. SUPER	CHIEF OPERATOR	FOREMAN	PLANT MECHANIC	PLANT ELECT.	LAB. TECH.	FILTER OP.	SENIOR OP.	OPERATOR	GROUNDS-JANIT.	CLERK	CASUAL					
BRAMPTON			1							2			1	4	2.0	2.21	2.0	56
BRANTFORD	1			5	1	1	1	1		10	1	1	0.5	22.5	12.5	6.07	1.8	168
BURLINGTON D.L.									1	2				3	2.5	2.26	1.2	88
BURLINGTON E.G.									1	1				2	0.75	0.64	2.7	48
BURLINGTON SKY.	1				1					3				5	3.125	2.24	1.6	48
CONISTON										1				1	0.260	0.18	3.8	40
FERGUS			1							1				2	0.6	0.49	3.3	54
GALT			1							5	1			7	5.0	5.18	1.4	112
GEORGETOWN			1							2				3	1.5	0.84	2.0	48
HUNTSVILLE										1				1	0.25	0.17	4.0	40
KINGSTON TWP.			1							1				2	0.83	0.31	2.4	56
KITCHENER	1	1	1	1	1	1	1		5	5	2			18	13.5	8.30	1.3	168
LAKEVIEW	1				1					4	1		1.5	7	5.0	6.44	1.4	117
MARKHAM VILLAGE			1							1				2	0.334		6.0	56
MOORE TWP.										1				1	0.320	0.09	3.1	40
NEPEAN TWP.			1							2			0.2	3.2	1.5	1.99	2.1	56
NORTH BAY	1				1	1				4			0.2	7.2	4.0	3.39	1.8	112
ORANGEVILLE										1				1	0.75	0.51	1.3	40
PORT COLBORNE E.S.			1		1					6				8	0.85	0.36	4.6	168
PORT COLBORNE W.S.															0.9	0.80		
PRESTON			1							3				4	1.8	0.78	2.2	48
RICHMOND HILL			1							2			1	4	1.6	1.29	2.5	56
SIMCOE			1							2			0.5	3	1.4	1.33	2.1	48
SIDNEY TWP.										0.5				0.5	0.12	0.26	4.2	26
STRATFORD	1									6			0.5	7.5	4.0	2.72	1.9	168
STREETSVILLE										1			1	2	0.8	0.47	2.5	48
TILLSONBURG			1							1				2	0.67	0.51	3.0	48
WATERLOO	1				1					6				8	4.0	2.34	2.0	112
WESTMINSTER										1				1	0.25	0.14	4.0	40
TOTAL	7	1	12	6	7	3	2	1	7	76.5	5	1	6.5	134				

OPERATING STAFF
1964
GRAPH 21



SUMMARY

The purpose of this summary report is to compare a large number of individual plants operated by the Ontario Water Resources Commission and to reach some conclusions by comparing the plants under different categories.

It is most difficult to make a summary of a summary and arrive at many meaningful conclusions. The widely different designs of the many plants provided the opportunity of encompassing the whole sewage treatment field but there is the distinct disadvantage in not being able to compare plants under similar operating conditions.

Some of the categories studied revealed meaningful results because of the relative accuracy of the available data. Information on flows and operating costs are examples.

Generally most of the comparisons indicate wide ranges of values which can only suggest further study on those plants which are greatly different from the average. The lack of accurate information on digestion makes any conclusions impossible.

In spite of the many faults and ommissions revealed, a summary such as this is invaluable in assessing the actual operation of a large number of different plants. The fact that inaccuracies and ommissions can be revealed in this report is a justification in itself for producing such a report. It is only in this way that efforts can be directed toward improving the information available from individual plants so that efficient operation of the plants can be maximized and future summary reports can be made more meaningful and informative.

1964 operating summary : water pollution control plants.


ONTARIO WATER RESOURCES COMMISSION